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# THREADFINS OF THE WORLD
# (Family Polynemidae)

## AN ANNOTATED AND ILLUSTRATED CATALOGUE OF POLYNEMID SPECIES KNOWN TO DATE

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# THREADFINS OF THE WORLD

## (Family Polynemidae)

### AN ANNOTATED AND ILLUSTRATED CATALOGUE OF POLYNEMID SPECIES KNOWN TO DATE

by

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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

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## PREPARATION OF THIS DOCUMENT

This document was prepared under the FAO Fisheries Department Regular Programme by the Species Identification Programme in the Marine Resources Service of the Fishery Resources Division. It is the third number in the new series: *FAO Species Catalogue for Fishery Purposes.*

The family Polynemidae (threadfins) is important in commercial and sport fisheries of tropical and subtropical seas, especially in the Middle and Near East, South Asia, Southeast Asia, Oceania, and west Africa. However, detailed fishery information is usually not available, largely because of difficulties with the correct identification of species. This difficulty is because of past taxonomic confusion and the similarity of overall body appearance and colour pattern of some species. Therefore, this catalogue is timely as an accurate and complete worldwide guide to the identification of polynemids. It is intended to help fisheries workers gather statistics and examine aspects of their biology that will be useful for the management of this fishery resource. The author has studied polynemids taxonomically on the basis of a large number of specimens, including all of available known types, in museum collections and markets throughout the world. He has published numerous scientific articles on polynemids, which were the source for most of the taxonomic and ecological information in this catalogue.

In view of the importance of overall body appearance for identification, photographs for all species have been included.

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ABSTRACT

This is the third number in the new FAO series of worldwide annotated and illustrated catalogues of major groups of organisms that enter marine fisheries. The present volume on the family Polynemidae includes 41 species belonging to 8 genera. There is an introductory section with general remarks on habitat and fisheries of the family, a glossary of technical terms, an illustrated key to each genus and all species, and a detailed account for all species. Species accounts include an illustration of each species, scientific and vernacular names, and information on habitat, biology, fisheries, size, relevant literature, and distribution. Following the species accounts are a list of nominal species in the family, a table of species by major marine fishing areas, and colour plates. A list of all nominal species and their present allocations is given. The work is fully indexed and there is a comprehensive list of references to pertinent literature.

**Distribution**

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# 1. INTRODUCTION

The family Polynemidae comprises 41 species in 8 genera (Fig. 1). In many parts of the tropics, the marine polynemids, including ***Eleutheronema***, ***Galeoides***, ***Leptomelanosoma***, ***Pentanemus*** and ***Polydactylus***, are important food fishes (some species attaining 2 m in total length), with the largest quantities taken commercially. However, separate catch statistics are not reported for most species and landings are usually summarized as a vernacular name which often corresponds to two or more species. This lack of species-specific catch data is due to the difficulty in identifying many of the species. For the proper management of this resource correct specific identifications are necessary.

Polynemids are easily identified as a family due to their similarity in overall body appearance, and condition of the eye and pectoral-fin rays. They have a conical snout, inferior mouth, adipose eyelid (firm transparent gelatinous tissue) covering the eye, 2 well-separated dorsal fins, 3 to 16 thread-like (individually-separated) lower pectoral-fin rays (pectoral filaments) and the caudal fin deeply forked to lunate. However, these external morphological similarities have led to much confusion in specific identifications. The pectoral filaments of polynemids are the most distinctive feature, specific identifications to date having been based mainly on the number and length of the former. Taxonomic confusion in polynemids may, however, result from identifications based on pectoral filaments only. For example, ***Polydactylus*** species characterized by a large black anterior lateral-line spot have until recently been considered to include 3 species, ***P. microstomus*** (5 pectoral filaments), ***P. mullani*** (7 filaments) and ***P. sextarius*** (6 filaments). The latter, however, an Indo-West Pacific species originally believed to range from South Africa to Papua New Guinea, is now known to comprise 3 species: ***P. malagasyensis*** (distributed off the east coast of Africa and Madagascar), ***P. persicus*** (Persian Gulf), and ***P. sextarius*** (India to Papua New Guinea), all with 6 pectoral filaments.

The purposes of this polynemid catalogue are to provide a means of identifying the various species and to present a synopsis of the literature on the biology and fisheries of these species. The genera ***Eleutheronema*** (3 species), ***Galeoides*** (1 species) and ***Leptomelanosoma*** (1 species), plus the Indo-Pacific ***Polydactylus*** (14 species) and eastern Pacific ***Polydactylus*** (2 species) have been recently revised by the author of this catalogue and colleagues (Motomura and Iwatsuki, 2001a; Motomura, Iwatsuki and Kimura, 2001b; Motomura *et al.*, 2002a; Motomura, 2002; Motomura, Kimura and Iwatsuki, 2002) the results of those studies being incorporated here. Treatments of the genera ***Filimanus*** (6 species) and ***Parapolynemus*** (1 species) were greatly facilitated by the revisions of Feltes (1991, 1993). Taxonomic information given here for ***Polynemus*** (8 species) and western Atlantic ***Polydactylus*** (3 species) was taken from on-going revisions of those genera by the author, and publications on the living marine resources of the western central Pacific and western central Atlantic (FAO Species Identification Guides for Fisheries Purposes). The taxonomic information provided for all of the polynemid species covered here is based on the examination by the author of all known available type specimens and a large number of non-type specimens, representing broad geographical ranges of each species.

## 1.1 Habitat and Biology

Polynemids are epibenthic fishes found in the tropical and subtropical waters of all oceans. Most species occur in coastal waters and estuaries, although some (e.g. ***Polynemus*** species and ***Polydactylus macrophthalmus***) live entirely in fresh-water rivers. Polynemids generally occur on sandy and muddy bottoms in depths less than 150 m, although juveniles are found in seagrass beds and tidepools.

As major predators of coastal and estuarine ecosystems, most polynemids generally feed on a variety of fishes and crustaceans. A few small species (e.g. ***Filimanus*** species) have numerous gillrakers adapted for plankton feeding. Young stages of most polynemids also feed on plankton, some species later becoming piscivorous with growth. The number of gillrakers tends to decrease with fish size in all of the ***Eleutheronema*** species, those on the anterior parts of both the upper and lower limbs being replaced during fish growth by tooth plates with villiform teeth. Furthermore, each gillraker on both the upper and lower limbs becomes shorter with fish growth, indicative of a change from plankton feeding to piscivorous habits.

The pectoral fins of polynemids are their most distinctive feature, being divided into an upper part with the rays joined by membranes and a lower part with 3 to 16 separate rays (pectoral filaments). The pectoral filaments have been considered to operate as a sense organ, enabling polynemids to search for food in muddy water (Motomura, Sado and Kimura, 2002). In particular, ***Parapolynemus*** and ***Polynemus*** species, generally occurring in fresh-water rivers and estuaries, have extremely long pectoral filaments that exceed their total length. Pectoral filaments are usually spread forward to enable searching for prey while swimming and probably act as a substitute for eyesight. An exception, ***Leptomelanosoma indicum***, also generally occur in muddy water in large river mouths (e.g., Ganges and Chao Phraya rivers) but does not have long pectoral filaments. Instead it has an unique swimbladder with numerous appendages in 2 rows along the entire, approximate midlateral surface. Because these appendages are fully inserted into the lateral walls of the abdominal cavity, the tips being located near the outer layer of epidermal tissue, the swimbladder is considered to have the capacity for sensing water vibrations caused by movements of prey. Underwater observations of ***L. indicum*** indicate that it usually spreads the pectoral filaments, but remains motionless on the bottom, a behaviour pattern unknown in other members of the family. In addition to the apparent ability of ***L. indicum*** to sense subtle water vibrations while themselves remaining motionless, there exists also the possibility that the swimbladder appendages transmit sounds and may enable communication with conspecific individuals. Specializations of both the pectoral filaments and swimbladder in polynemids have probably arisen as an adaptation to their muddy habitats.

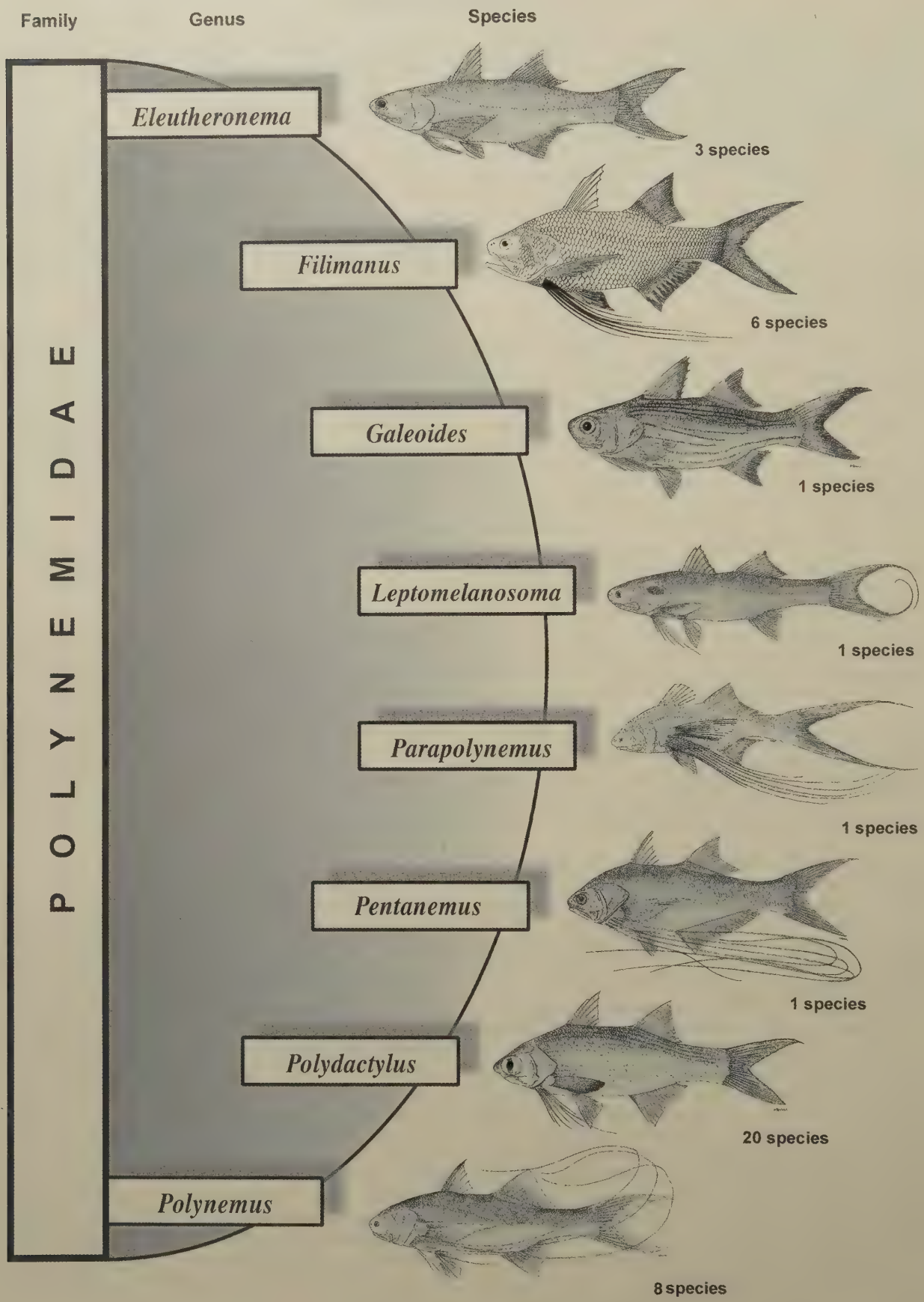



**Fig. 1 Classification of the family Polynemidae**

Judging from the few species that have been studied, most polynemids exhibit protandry, their sex changing from male to female with fish growth. However, spawning behaviour of polynemids has never been reported. Although the spawning grounds of most polynemids are also unknown, they probably occur in coastal waters and estuaries. In the northern Bay of Bengal, ***Polynemus paradiseus*** may ascend higher up rivers than usual for breeding purposes (David, 1954).

Information on the larval development of polynemids is minimal. Eggs are spherical and pelagic (de Sylva *in* Moser *et al.*, 1984). Data for ***Eleutheronema tetradactylum***, ***Polydactylus sexfilis***, and ***Polynemus paradiseus*** suggest that polynemids are 0.8 to 2.0 mm long at hatching, have a large yolk sac, unpigmented eyes, an unformed mouth and pigment that may intensify during yolk absorption (Jones and Menon, 1953; Kowtal, 1972; May, Akiyama and Santerre, 1979). Leis and Trnski *in* Leis and Carson-Ewart (2000) described larval developmental stages of ***Eleutheronema tetradactylum*** and ***Polydactylus multiradiatus*** from Australian waters (Figs 2 and 3), and summarized larval morphology of Indo-Pacific polynemids: moderate to deep bodied, compressed; gut coiled and triangular, reaching between 44 and 62% of body length; gas bladder conspicuous, located near apex of gut mass; head initially round, slightly elongated by 7 mm; mouth initially oblique, reaching to level of midpupil, becoming horizontal and inferior, and extending beyond level of posterior margin of eye by about 6 mm; many small villiform teeth on upper and lower jaws at 2.5 mm; adipose eyelid not present until at least 15 mm, but present by settlement stage; a very small spine appearing at anterior tip of maxilla, disappearing shortly thereafter (see Figs 2c and 3b); dorsal- and anal-fin anlagen appearing in preflexion larvae from 3.0 to 4.1 mm, soft rays developing during flexion; feeble spines of first dorsal and anal fins starting to form in early post-flexion larvae; pectoral-fin elements beginning to differentiate in late flexion to early post-flexion larvae; pectoral-fin rays fully ossified by 6.5 mm, at which time ossification of pectoral filaments initiated; all pectoral-fin elements ossified shortly after 7 mm; pectoral-fin base initially level with top of gut, but beginning to move ventrally shortly after flexion, eventually located near ventral margin of body by about 12 mm, except in ***Parapolynemus*** and ***Polynemus*** species; scales beginning to form laterally on trunk and tail from about

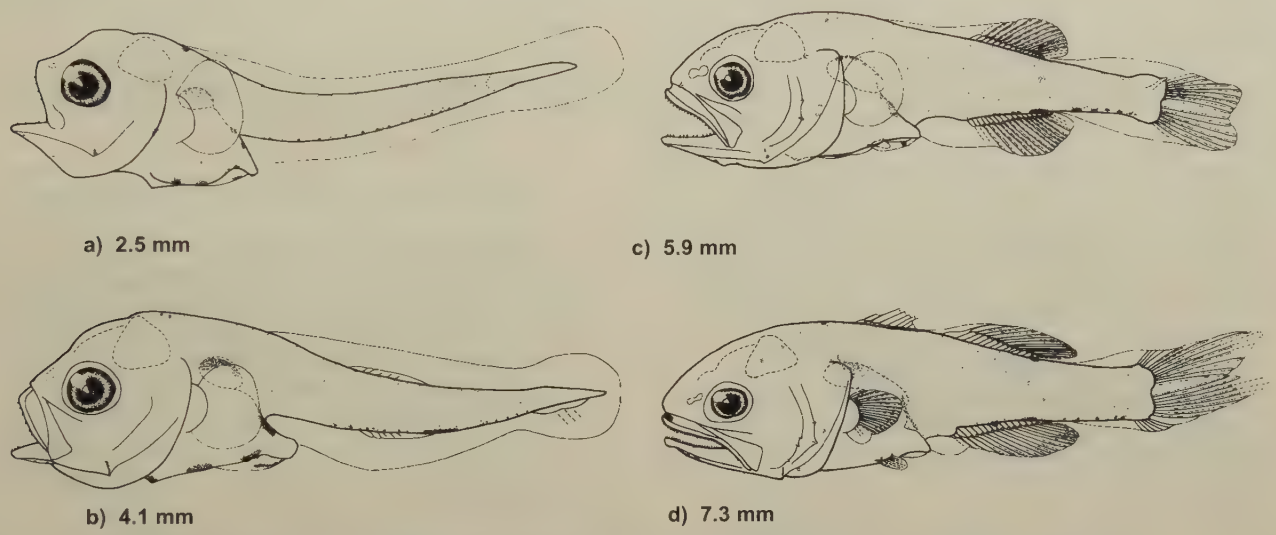



**Fig. 2 Larval development of *Eleutheronema tetradactylum*** (from Leis and Trnski, 2000)

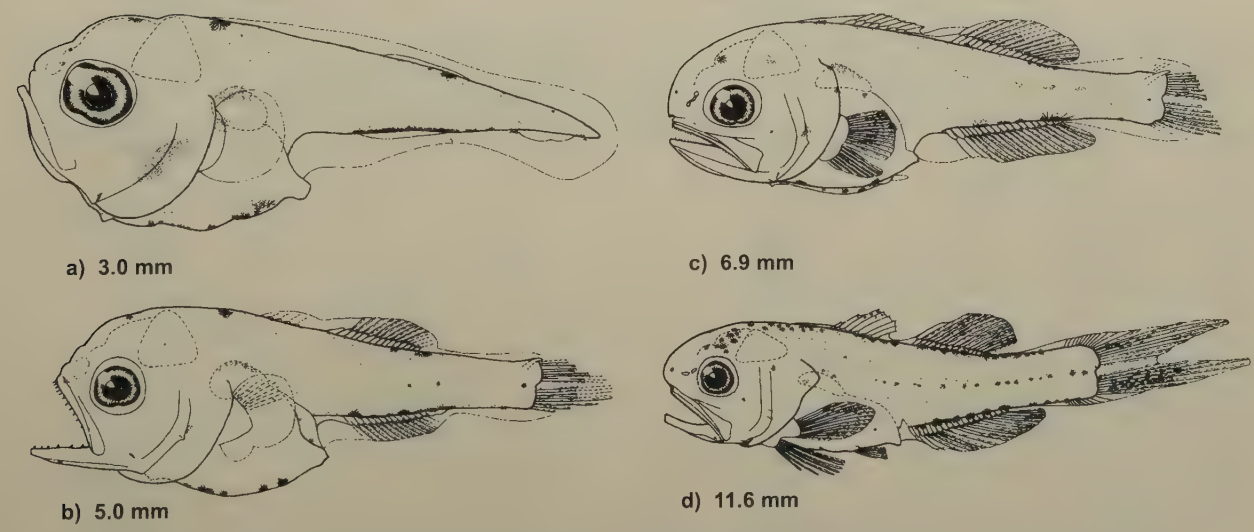



**Fig. 3 Larval development of *Polydactylus multiradiatus*** (from Leis and Trnski, 2000)

12 mm; all scales present by 15 mm. There is no distinct transformation to the adult form, development is direct and gradual. A small spine on the anterior tip of the maxilla is the only apparent specialization for larval life.

## 1.2 Fisheries

Polynemids are of considerable importance in commercial fisheries in tropical and subtropical seas worldwide (Tables 1 to 3), and in the sport fishery off Australia and the west coast of Africa. A few species (e.g. ***Eleutheronema tetradactylum*** and ***Polydactylus sexfilis***) are used in aquaculture (Table 4). Fresh-water polynemids (e.g. ***Polynemus aquilonaris*** and ***P. multifilis***) are sometimes used as aquarium fishes.

Polynemids contribute to the global fish catch, with about 93 000 t reported to FAO for 2001 (Table 1). FAO compiled statistics (Fishstat Plus 2000), may however greatly underestimate the total catch, because most polynemids are caught by local fisheries in tropical regions, where collection and reporting of detailed statistics at the species level encounter difficulties and several countries still report their catches by large groups of species. In these circumstances, the catch data presented by individual species items are likely to be underestimated and an unknown proportion of the catches for a species or group of species might have been reported by the national office under miscellaneous fishes. In particular, the catch statistics of ***Eleutheronema tetradactylum*** have been reported only from Kuwait, Pakistan and Taiwan Province of China (Table 1), although the species is widely distributed from the Persian Gulf to Australia and Papua New Guinea, and is one of the most important fisheries species for countries throughout those regions. The largest commercial catch of polynemids has been reported from the Western Central Pacific (Table 2, FAO Fishing Area 71). Most catch statistics reported from fresh-water rivers in India (Table 2, FAO Fishing Area 4) probably involved ***Polynemus paradiseus***, although catches were recorded as Polynemidae spp. From 1970 to 2001, there has been a general increase in landings of polynemids (Table 3).

**Table 1**
**FAO Reported world catch of polynemids in metric tonnes by area in 2001**

| Species | Main Areas | | | | |
|---|---|---|---|---|---|
| | Inland waters | Atlantic Ocean | Indian Ocean | Pacific Ocean | Grand Total |
| *Eleutheronema tetradactylum* | | | 55 | 1 715[1/] | 1 770 |
| *Galeoides decadactylus* | | 17 101 | | | 17 101 |
| *Pentanemus quinquarius* | | 3 947 | | | 3 947 |
| *Polydactylus quadrifilis* | | 12 447 | | | 12 447 |
| Polynemidae spp. | 66 | 2 258 | 15 894 | 39 434 | 57 652 |
| **Grand Total** | **66** | **35 753** | **15 949** | **41 149** | **92 917** |

[1/] Catches of a Polynemidae species reported by Taiwan Province of China probably belong to *Eleutheronema rhadinum* (Motomura *et al.*, 2002a) instead of *E. tetradactylum*.

## 1.3 Classification of the Family Polynemidae

The family Polynemidae have long been considered to be related to the Mugilidae and Sphyraenidae, but there is no convincing evidence to support that relationship (Johnson, 1993). In fact, Johnson (1993) stated that evidence at that time supported a sister-group hypothesis for Polynemidae and Sciaenidae, suggesting that they might be included in a superfamily (Polynemoidea). However, otolith evidence does not support such a placement (Grove and Lavenberg, 1997) and the taxonomic status and relationships of the Polynemidae remain poorly known.

**Table 2**
**FAO Reported world catch of polynemids in metric tonnes by FAO Fishing Areas in 2001**

| Species | FAO Fishing Areas | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 4 | 34 | 47 | 51 | 57 | 61 | 71 | 87 |
| *Eleutheronema tetradactylum* | | | | 55 | | 1 715[1/] | | |
| *Galeoides decadactylus* | | 17 101 | | | | | | |
| *Pentanemus quinquarius* | | 3 947 | | | | | | |
| *Polydactylus quadrifilis* | | 12 447 | | | | | | |
| Polynemidae spp. | 66 | 424 | 1 834 | 2 827 | 13 067 | | 39 424 | 10 |
| **Grand Total** | **66** | **33 919** | **1 834** | **2 882** | **13 067** | **1 715** | **39 424** | **10** |

[1/] Catches of a Polynemidae species reported by Taiwan Province of China probably belong to *Eleutheronema rhadinum* (Motomura *et al.*, 2002a) instead of *E. tetradactylum*.

**Table 3**
**FAO Reported world catch of polynemids in metric tonnes for the year 1970 to 2001**

| Species | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Eleutheronema tetradactylum*[1/] | 1 440 | 2 759 | 3 423 | 5 639 | 4 559 | 4 284 | 5 200 | 5 353 | 7 558 | 6 652 | 5 850 | 7 849 | 8 286 | 6 341 | 6 414 | 7 584 |
| *Galeoides decadactylus* | 3 624 | 4 218 | 5 205 | 3 355 | 3 974 | 3 556 | 5 938 | 8 304 | 8 515 | 10 451 | 10 551 | 9 031 | 12 366 | 11 630 | 11 933 | 13 312 |
| *Pentanemus quinquarius* | 329 | 196 | 100 | 100 | 100 | 106 | 910 | 1 545 | 2 214 | 290 | 342 | 432 | 483 | 438 | 994 | 973 |
| *Polydactylus quadrifilis* | | | | | | | | | | 450 | 450 | 377 | 281 | 451 | 421 | 749 |
| Polynemidae spp. | 34 155 | 42 030 | 35 356 | 49 384 | 58 613 | 52 017 | 43 131 | 47 003 | 53 960 | 47 897 | 37 129 | 38 605 | 44 145 | 43 111 | 43 104 | 42 440 |
| **Total** | **39 548** | **49 203** | **44 084** | **58 478** | **67 246** | **59 963** | **55 179** | **62 205** | **72 247** | **65 740** | **54 322** | **56 294** | **65 561** | **61 971** | **62 866** | **65 058** |

| Species | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Eleutheronema tetradactylum*[1/] | 7 871 | 12 472 | 16 362 | 13 291 | 12 125 | 8 008 | 11 055 | 11 063 | 5 256 | 4 281 | 3 673 | 4 614 | 4 217 | 2 414 | 6 980 | 1 770 |
| *Galeoides decadactylus* | 14 322 | 13 838 | 14 475 | 10 093 | 11 394 | 12 542 | 9 893 | 7 228 | 8 500 | 12 903 | 17 768 | 18 385 | 12 890 | 10 764 | 13 948 | 17 101 |
| *Pentanemus quinquarius* | 2 063 | 2 070 | 1 515 | 872 | 870 | 2 620 | 4 882 | 4 634 | 4 218 | 3 734 | 3 005 | 3 356 | 4 430 | 4 162 | 3 612 | 3 947 |
| *Polydactylus quadrifilis* | 118 | 151 | 9 453 | 3 | 147 | 4 905 | 8 120 | 2 401 | 3 670 | 3 598 | 7 359 | 10 705 | 10 023 | 10 770 | 12 237 | 12 447 |
| Polynemidae spp. | 42 762 | 49 464 | 50 953 | 67 278 | 41 990 | 47 995 | 54 636 | 47 024 | 50 907 | 54 624 | 51 837 | 50 769 | 53 842 | 53 098 | 53 707 | 57 652 |
| **Total** | **67 136** | **77 995** | **92 758** | **91 537** | **66 526** | **76 070** | **88 586** | **72 350** | **72 551** | **79 140** | **83 642** | **87 829** | **85 402** | **81 208** | **90 484** | **92 917** |

[1/] Catches of a Polynemidae species reported by Taiwan Province of China probably belong to *Eleutheronema rhadinum* (Motomura *et al.*, 2002a) instead of *E. tetradactylum*

**Table 4**
**FAO Reported aquacultural catch of polynemids in metric tonnes for the years 1972 to 2001**

| Species | Country | Area | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Eleutheronema tetradactylum* | Thailand | 71 | 15 | 16 | 16 | | 409 | 155 | 4 | | | |
| *Eleutheronema tetradactylum* | Singapore | 71 | | | | | | | | | 3 | |
| *Eleutheronema tetradactylum*[1/] | Taiwan (Province of China) | 61 | | | | | 1 | 2 | 16 | 38 | 16 | 5 |

[1/] Aquaculture production of a Polynemidae species reported by Taiwan Province of China probably belongs to *Eleutheronoma rhadinum* instead of *E. tetradactylum*.

## 1.4 Illustrated Glossary of Technical Terms and Measurements

**Anal-fin base length** - The straight-line distance from the anal-fin origin to the posterior basal end of the anal-fin base (Fig. 4).

**Body depth** - The vertical distance from first dorsal-fin origin to ventral surface (Fig. 4).

**Body width** - The width (thickness) between pectoral-fin bases.

**Caudal fin** - The tail fin (Fig. 4).

**Caudal peduncle** - The part of the tail joins the caudal fin to the body.

**Caudal-peduncle depth** - The least depth of the peduncle (Fig. 4).

**Caudal-peduncle length** - The straight-line distance from the rear end of the anal-fin base to a vertical at the caudal-fin base (Fig. 4).

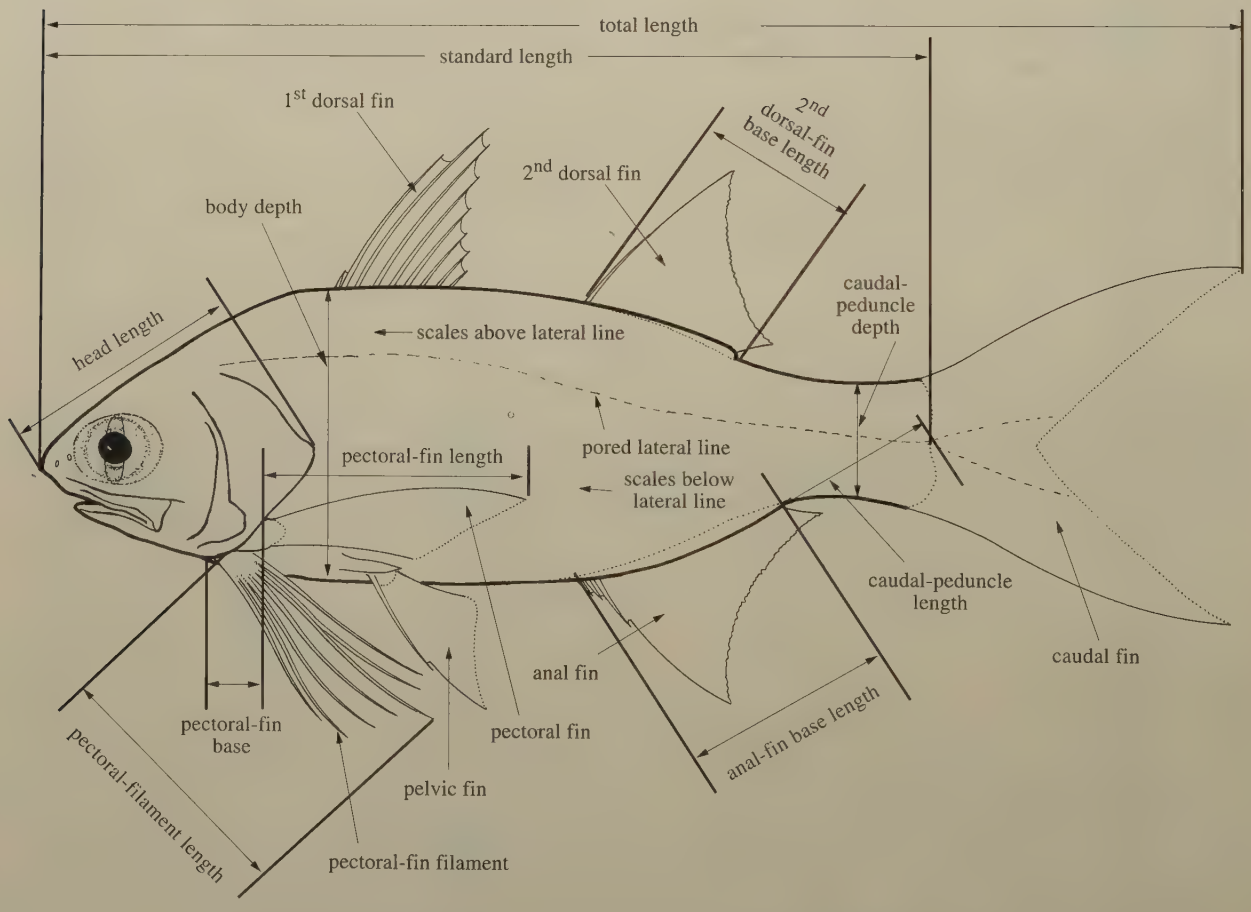



**Fig. 4 External morphology and measurements**

**Cranium** - Bony part of the head, enclosing the brain. It is composed of many different bones (Fig. 5).

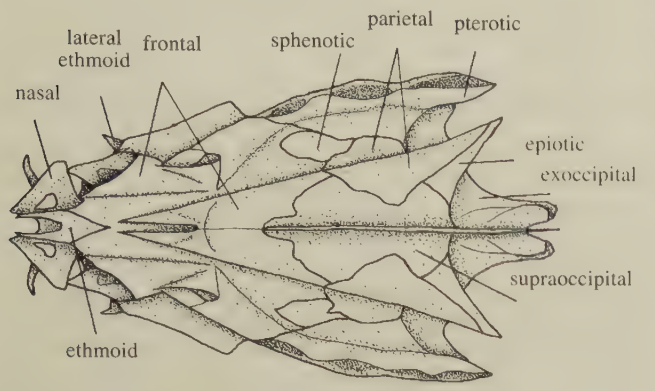



**Fig. 5 Dorsal view of cranium of *Leptomelanosoma indicum*** (from Motomura and Iwatsuki, 2001a)

**Dorsal fin** - A median fin along the back. Polynemids have 2 dorsal fins; the first is supported by spinous rays while the second has 1 spinous ray anteriorly and soft rays posteriorly (Fig. 4).

**Ectopterygoids** - The paired bones on each side of the roof of the mouth immediately posterior to the palatines (Fig. 6).

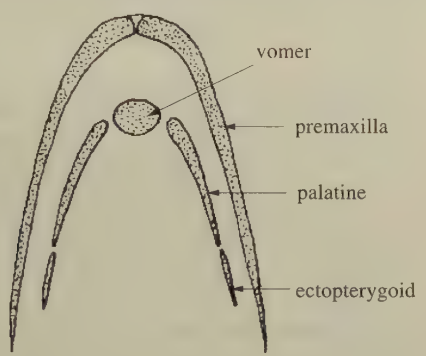



**Fig. 6 Ventral view of dentition of premaxilla and roof of oral cavity**

**Eye diameter** - The horizontal distance between the fleshy margins of the eye (Fig. 7).

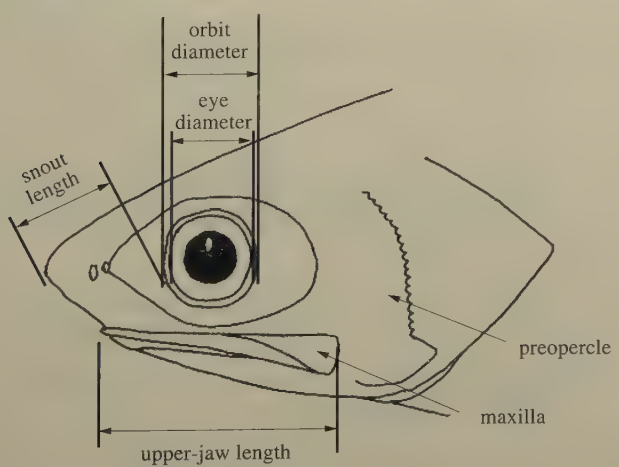



**Fig. 7 Parts of head**

**Gillrakers** - The long bony protuberances along the anterior (inner) edge of the gill arches (Fig. 8). Gillraker counts are often given as 2 numbers (X + Y), where X is the number of rakers on the upper limb of the first arch, and Y is the number of rakers on the lower limb, with the raker at the angle (junction of upper and lower limbs) included in the lower-limb count.

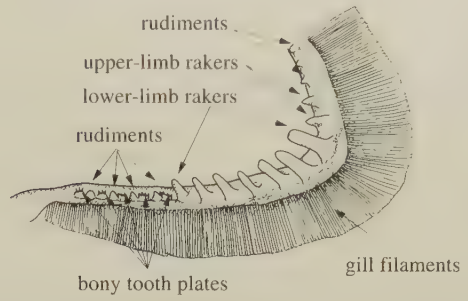



**Fig. 8 Gillrakers**
(after Heemstra and Randall, 1993)

**Head length** - The distance from the most distant end of the opercle to the anterior tip of the snout (Fig. 4).

**Interorbital length** - The least distance between the orbits.

**Maxilla** - The posterior, toothless bone of the upper jaw; partly covered by the upper lip when the mouth is closed (Fig. 7).

**Orbit diameter** - The horizontal distance between the bony margins of the eye (Fig. 7).

**Palatines** - The paired bones on each side of the roof of the mouth immediately posterior to the vomer (Fig. 6).

**Pectoral fin** - The fin on each side of the body immediately behind the gill opening (Fig. 4). Pectoral-fin ray counts only include rays interconnected by a membrane; the lower free rays are given separately.

**Pectoral-fin base** - The distance from the uppermost point of the pectoral-fin base to the lowermost point of the pectoral-filament base (Fig. 4).

**Pectoral-fin length** - The distance from the posterior tip of the pectoral-fin ray to the uppermost point of the pectoral-fin base (Fig. 4).

**Pectoral filaments** - The free rays below the pectoral-fin rays (Fig. 4). Pectoral-filament counts are made from the anteriormost (ventralmost) element.

**Pectoral-filament length** - The distance from the posterior tip of the pectoral filament to the base of the filament (Fig. 4).

**Pelvic fin** - Paired fins ventrally on the body behind the pectoral fins (Fig. 4).

**Pored lateral-line scales** - The series of pored scales that run from the upper end of the gill cavity to the caudal fin (Fig. 4).

**Premaxilla** - The paired, tooth-bearing bones of the upper jaw (Fig. 6).

**Preopercle** - The rounded or angular bone on the front part of the opercle; the posterior edge is exposed (Fig. 7).

**Ray** - The rigid or flexible struts that support the fins. Soft rays are segmented and flexible. Spinous rays are unsegmented, simple (unbranched) and pungent (stiff and sharp pointed). The number of spines are designated by roman numerals (I, II, III, IV . . .) and the number of soft rays are designated by Arabic numerals (1, 2, 3, 4 . . .). The last ray of the second dorsal and anal fins of polynemids is split to its base and looks like 2 rays, but it is counted as a single ray because it is supported by a single pterygiophore.

**Scales above and below lateral line** - A transverse series of scale rows; scales below lateral line are counted from the origin of the anal fin in an oblique row to the lateral-line scale, but not including the lateral-line row; scales above lateral line are counted from the origin of the first dorsal fin in an oblique row to the lateral-line scale, but not including the lateral-line row (Fig. 4).

**Second dorsal-fin base length** - The straight-line distance from the second dorsal-fin origin to the posterior basal end of the second dorsal-fin base (Fig. 4).

**Snout length** - The distance from the anterior margin of orbit to the anterior tip of the snout (Fig. 7).

**Standard length** - The straight-line distance from the tip of the snout to a vertical line passing through the base of the caudal fin (taken to be the point of flexure of the caudal fin) (Fig. 4).

**Supraneural bones** - Unpaired bones above the neural spines of anterior vertebrae between the skull and the origin of the dorsal fin (Fig. 9).

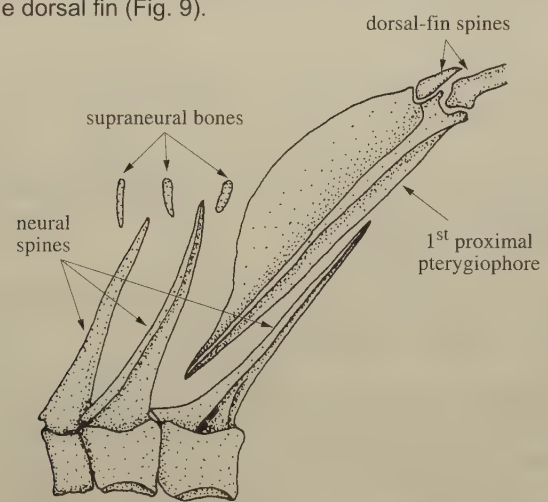



**Fig. 9 Supraneural bones, anterior neural spines and first proximal pterygiophore**

**Swimbladder** - A gas filled sac in the dorsal part of the body cavity.

**Synonym** - An alternate name given to a particular species, genus, family etc. The oldest (senior) synonym that is given to a species is usually considered the valid (correct) scientific name for that species.

**Total length** - The straight-line distance from the tip of the snout to a vertical line passing through the posterior tip of the caudal-fin ray (Fig. 4).

**Upper-jaw length** - The distance from the anterior tip of the premaxilla to the posterior margin of the maxilla (Fig. 7).

**Vertebrae** - Axial skeleton bone; divided into 2 sections, precaudal (abdominal) and caudal vertebrae.

**Vomer** - A median bone which lies on the roof of the mouth (Fig. 6).

## 1.5 Plan of the Catalogue

A diagnosis of the family Polynemidae is given, followed by aids to identification of polynemids (keys to genera and species), and the information by genus and species (arranged alphabetically by genus and species). Since most species occur only in a single major region, the key to species of the largest genus, ***Polydactylus***, is divided into regional keys to shorten them and make them easier to use. Each genus account includes the type species and generic synonyms. For genera with more than 1 species, the diagnosis and general comments on the habitat, biology, distribution and interest to fisheries of the included species are listed. The information pertaining to species is divided into the following sections:

(1) **Scientific Name:** The reference to the original description, type locality, and type information of the species is given. Type information includes the museum catalogue number of the type specimen (abbreviations for museums defined in 'Acknowledgements').

(2) **Synonyms:** Primary synonyms and alternate combinations of generic and specific names are listed.

(3) **FAO Name:** The FAO English name is considered the standard to be used for fishery purposes. This should avoid confusion caused by the existence of multiple names for the same species or the same name for several species. The FAO name is not intended to supplant the use of local names, but rather to serve as a worldwide reference. FAO French and Spanish names are given for each species.

(4) **Diagnostic Features:** Distinctive characters of the species are given as an aid for identification. These diagnoses should be consulted to confirm species identified using the illustrated key.

(5) **Geographical Distribution:** The general geographic range is given and illustrated on a map. The map shading includes known areas of occurrence and intermediate areas where a species is expected to be found.

(6) **Habitat and Biology:** Information on habitat, feeding preferences, reproduction and behaviour is given.

(7) **Size:** The maximum known size for each species.

(8) **Interest to Fisheries:** General information on the extent, type of fisheries and utilization is given. Detailed catch statistics (landings) are not available for all individual species.

(9) **Local Names:** Published local names are given. A local name is often applied to several species.

(10) **Literature:** Recent references that contain important taxonomic information are given.

(11) **Remarks:** Taxonomic details and information that is not appropriate in the previous paragraphs are included here.

# 2. SYSTEMATIC CATALOGUE

## 2.1 Diagnostic Features of the Family Polynemidae

**FAO Names: En** - Threadfins; **Fr** - Barbures; **Sp** - Barbudos.

**Diagnostic Features:** Body elongate to moderately deep, compressed. Snout obtusely conical, overhanging. Adipose eyelid (firm transparent gelatinous tissue) covering eye; 5 infraorbitals (3 in ***Parapolynemus***). Mouth ventral, near-horizontal and large; lip on upper jaw absent or poorly developed; maxilla extending beyond level of posterior margin of eye; supramaxilla absent; teeth villiform in broad bands on jaws, vomer, palatines and ectopterygoids (vomerine teeth absent in some species); canine, molariform or incisiform teeth absent. Posterior margin of preopercle serrated (without serrations in ***Parapolynemus*** and ***Pentanemus***); 7 branchiostegal rays, 1 ray present on epihyal. Two well-separated dorsal fins; first dorsal fin with VIII spines (VII spines in 2 ***Polynemus*** species); second dorsal fin with I spine and 11 to 18 soft rays; anal fin with III spines and 10 to 18 soft rays (II spines in 2 ***Polynemus*** species and 24 to 30 soft rays in ***Pentanemus***; the last dorsal- and anal-fin soft rays usually split to their base but counted as a single ray); pectoral fins divided into an upper part with 12 to 19 rays joined by membrane and a lower part with 3 to 11 separate rays (pectoral filaments) (14 to 16 separate rays in 1 ***Polynemus*** species); pelvic fin with I spine and 5 soft rays; scaly process (axillary scale) present at base of pelvic fin; caudal fin deeply forked; small scales covering most of dorsal, pectoral, anal and caudal fins; trisegmental pterygiophores absent. Scales weakly ctenoid, extending onto head; lateral line simple, extending from upper end of gill opening to posterior margin of caudal-fin membrane (lateral line bifurcating on caudal-fin base in 5 ***Polydactylus*** species and divided into 3 on caudal-fin base and membrane in 2 ***Eleutheronema*** species). Vertebrae 10 precaudal and 14 caudal (15 caudal in ***Eleutheronema*** and ***Polynemus***); supraneural bones 0 to 3.

The family Polynemidae, as here constituted, comprises 8 genera: ***Eleutheronema***, ***Filimanus***, ***Galeoides***, ***Leptomelanosoma***, ***Parapolynemus***, ***Pentanemus***, ***Polydactylus*** and ***Polynemus***.

## 2.2 Notes on the Identification of Polynemids

Because of the similarities in morphology and colour pattern of many polynemid species, correct identifications are often difficult. Unlike typical reef fishes, most polynemid fishes are not easily identified on the basis of live or fresh colours, although a few species have a distinct large black spot on the lateral body surface (e.g. ***Polydactylus malagasyensis***, ***P. mullani*** and ***P. sextarius***) and several dark stripes along the longitudinal scale rows above and below the lateral line (e.g. ***Polydactylus bifurcus*** and ***P. plebeius***). Live coloration of most polynemids, except e.g. ***Polydactylus plebeius*** and ***P. sexfilis***, has never been reported and the fresh colour of several species (e.g. ***Eleutheronema tridactylum*** and ***P. siamensis***) is also still unknown. Although the number and length of pectoral filaments is distinctive enough for identification of a few species, most polynemids can only be identified by a combination of morphological and meristic characters, such as fin-ray scale and gill-raker counts, and proportional measurements. The keys provided in this catalogue are based as much as possible on simple morphological and meristic characters, and proportional measurements.

Fin-ray counts are usually done with a bright light shining through the fin, which is fleshy and scaly in most polynemids. Pectoral-fin counts are more easily made on the inner side of the fin. The last dorsal- and anal-fin rays are split to their base but counted as a single ray. Pored lateral-line scale counts are facilitated by lying the fish on its right side (head pointing left) and directing a bright light at a low angle to the body surface. They may be assisted by using cyanin blue solution in 70% ethyl alcohol.

## 2.3 Illustrated Key to the Genera of Polynemids

**1a.** Pectoral-fin insertion well below midline of body; eye diameter variable, 1.3 or less in snout length (Fig. 10) . . . . . → *2*

**1b.** Pectoral-fin insertion near midline of body; eye diameter 1.3 or more in snout length (Fig. 11) . . . . . → *7*

**Fig. 10** ***Polydactylus bifurcus***

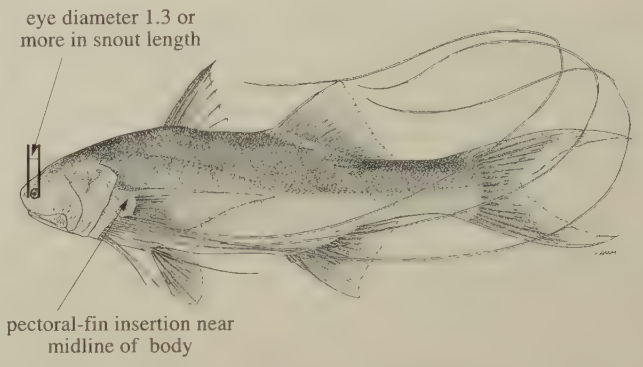



**Fig. 11** ***Polynemus paradiseus***

**2a.** Anterior part of lower jaw with small teeth extending onto lateral surface, adjacent portion of lip absent (Fig. 12) . . . . . ***Eleutheronema***
(Persian Gulf to Japan and Australia)

**2b.** Lip present (well or poorly developed) on anterior part of lower jaw (Fig. 13) . . . . . → *3*

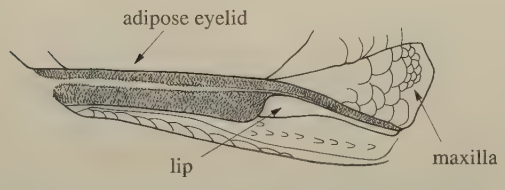



**Fig. 12 Left lateral view of upper and lower jaws of *Eleutheronema tetradactylum***
(after Motomura *et al.*, 2002a)

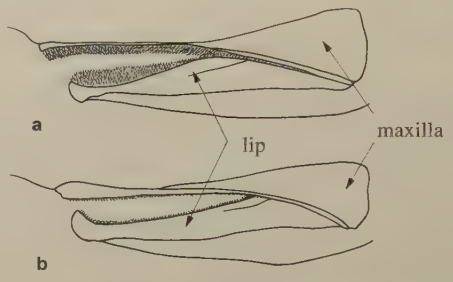



**Fig. 13 Left lateral view of upper and lower jaws of a) *Leptomelanosoma indicum* and b) *Polydactylus virginicus***
(after Motomura and Iwatsuki, 2001a)

**3a.** Anal-fin base length greater than head length; anal-fin rays 24 to 30 (Fig. 14) . . . . . ***Pentanemus***
(west coast of Africa)

**3b.** Anal-fin base length less than head length; anal-fin rays 10 to 18 (Fig. 15) . . . . . → *4*

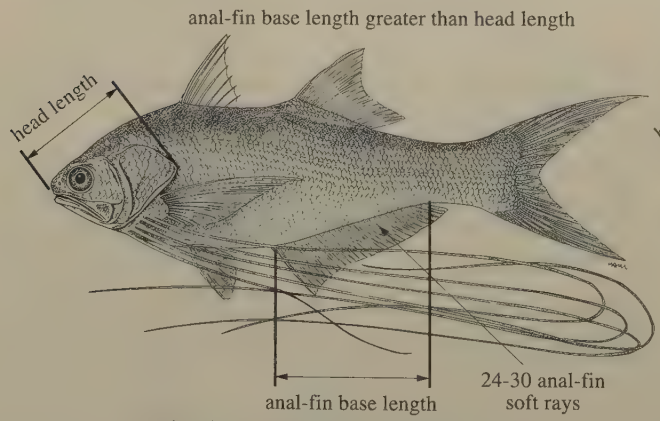



**Fig. 14** ***Pentanemus quinquarius***

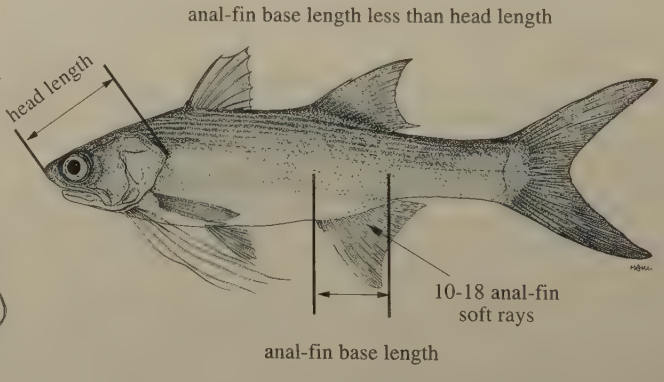



**Fig. 15** ***Polydactylus bifurcus***

**4a.** Pectoral-fin base length (including pectoral-filament base) greater than or equal to upper-jaw length (Fig. 16); lateral line simple, extending to lower end of upper caudal-fin lobe (Fig. 17); swimbladder present, extending beyond anal-fin origin . . . . . ***Galeoides***
(west coast of Africa)

**4b.** Pectoral-fin base length (including pectoral-filament base) less than upper-jaw length (Fig. 18); lateral line simple, extending to upper end of lower caudal-fin lobe or middistal margin of caudal fin, or bifurcated on caudal-fin base, extending to posterior margins of upper and lower caudal-fin lobes (Fig. 19); swimbladder absent, or if present, not extending beyond anal-fin origin . . . . . → *5*

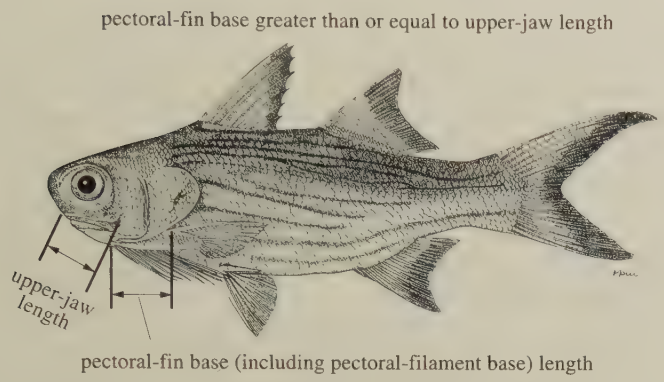

pectoral-fin base greater than or equal to upper-jaw length
upper-jaw length
pectoral-fin base (including pectoral-filament base) length

**Fig. 16** ***Galeoides decadactylus***

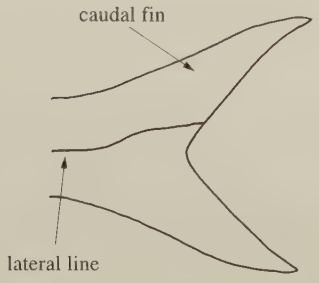



**Fig. 17 Lateral-line squamation on caudal-fin membrane of** ***Galeoides decadactylus***

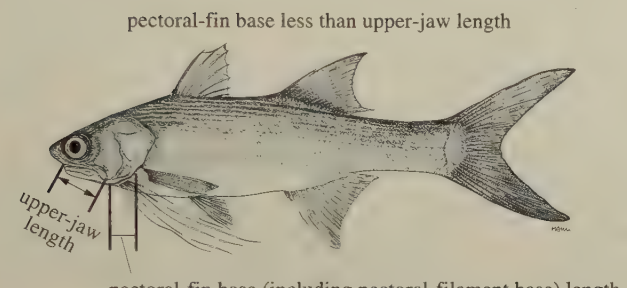

pectoral-fin base less than upper-jaw length
upper-jaw length
pectoral-fin base (including pectoral-filament base) length

**Fig. 18** ***Polydactylus bifurcus***

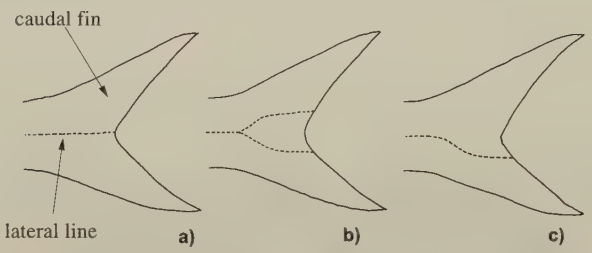



**Fig. 19 Lateral-line squamation patterns on caudal-fin membrane of a)** ***Filimanus perplexa*****, b)** ***Polydactylus bifurcus*** **and c)** ***Polydactylus plebeius***

**5a.** Space separating premaxillary teeth bands 2 or more times width of each band (Fig. 20); basisphenoid not in contact with prootic (Fig. 21) . . . . . ***Filimanus***
(Pakistan to Solomon Islands)

**5b.** Space separating premaxillary teeth bands less than width of each band (Fig. 22); basisphenoid in contact with prootic (Fig. 23) . . . . . → *6*

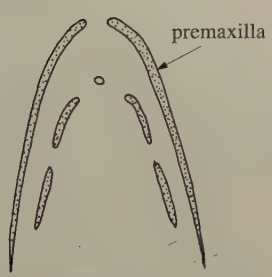



**Fig. 20 Ventral view of dentition of premaxilla and roof of oral cavity of** ***Filimanus***

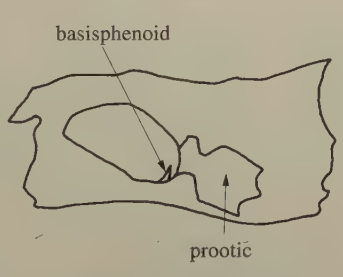



**Fig. 21 Lateral view of cranium of** ***Filimanus*** (after Feltes, 2001)

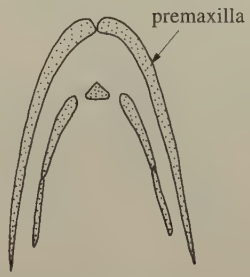



**Fig. 22 Ventral view of dentition of premaxilla and roof of oral cavity of** ***Polydactylus virginicus***

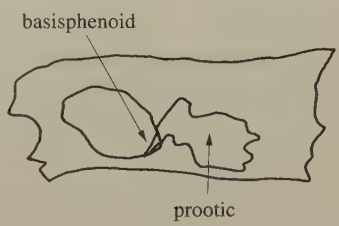



**Fig. 23 Lateral view of cranium of** ***Polydactylus*** (after Feltes, 2001)

**6a.** Tips of upper and lower caudal-fin lobes filamentous (Fig. 24); sphenotics exposed dorsally between anterior margins of parietal and pterotic (Fig. 25); swimbladder with many appendages inserted into lateral walls of abdominal cavity (Fig. 26) . . . ***Leptomelanosoma*** (Pakistan to Indonesia)

**6b.** Tips of upper and lower caudal-fin lobes not filamentous (Fig. 27); sphenotics not exposed dorsally (Fig. 28); swimbladder absent or present (without appendages) . . . . ***Polydactylus*** (worldwide)

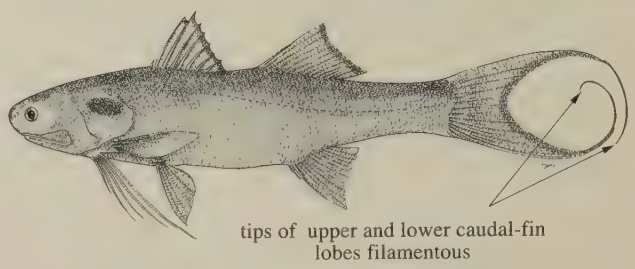



**Fig. 24** ***Leptomelanosoma indicum***

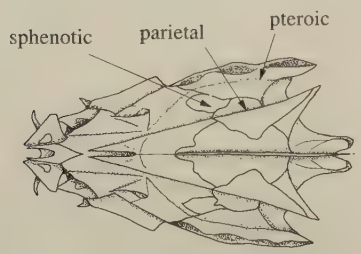



**Fig. 25 Dorsal view of cranium of** ***Leptomelanosoma indicum***

(from Motomura and Iwatsuki, 2001a)

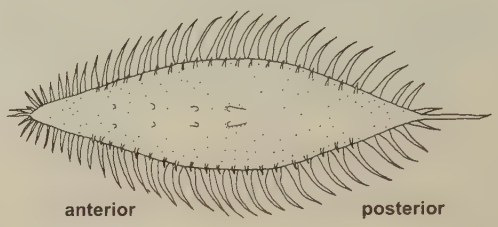



**Fig. 26 Dorsal view of swimbladder of** ***Leptomelanosoma indicum***

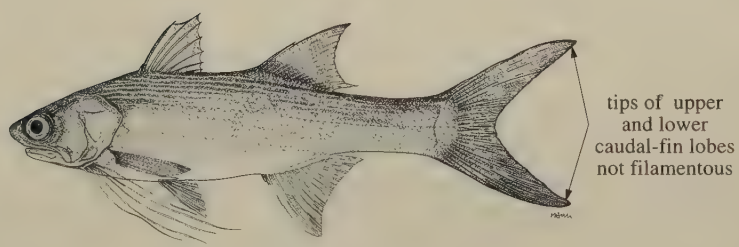



**Fig. 27** ***Polydactylus bifurcus***

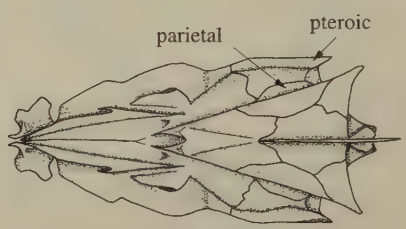



**Fig. 28 Dorsal view of cranium of** ***Polydactylus virginicus***

(from Motomura and Iwatsuki, 2001a)

**7a.** Posterior margin of preopercle serrated (Fig. 29) . . . . . ***Polynemus*** (India to Viet Nam and Indonesia)

**7b.** Posterior margin of preopercle unserrated (Fig. 30) . . . . . ***Parapolynemus*** (southern Papua New Guinea and northern Australia)

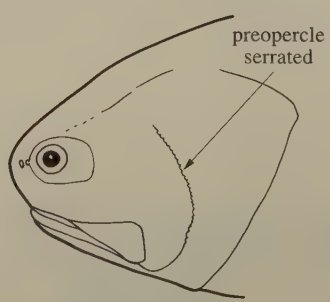



**Fig. 29 Head of** ***Polynemus paradiseus***

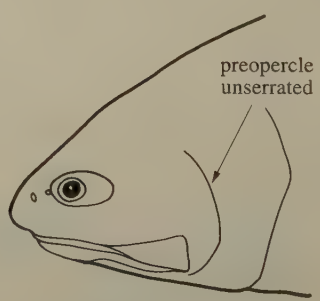



**Fig. 30 Head of** ***Parapolynemus verekeri***

## 2.4 Information by Genus and Species

### *Eleutheronema* Bleeker, 1862

*Eleutheronema* Bleeker, 1862a: 110 (type species: ***Polynemus tetradactylus*** Shaw, 1804).

**Synonyms:** None.

**Diagnostic Features:** Body and head elongate. Adipose eyelid well developed; eye diameter greater than snout length. Anterior parts of lower jaw with small teeth extending onto lateral surface, adjacent portion of lip absent; width of tooth band on upper and lower jaws greater than space (on symphysis) separating tooth bands on opposing premaxillae; teeth villiform in broad bands on jaws, vomer, palatines and ectopterygoids, tooth plates on palatines shorter than those on ectopterygoids. Posterior margin of maxilla extending well beyond level of posterior margin of adipose eyelid. Posterior margin of preopercle serrated. Basisphenoid in contact with prootic; sphenotics not visible dorsally between anterior margins of parietal and pterotic. First dorsal fin with VIII spines; second dorsal fin with I spine and 13 to 15 soft rays; anal fin with III spines and 14 to 16 soft rays; anal-fin base less than head length; pectoral fin with 15 to 19 rays, all unbranched; pectoral-fin insertion well below midline of body; pectoral-fin base (including base of pectoral filaments) less than upper-jaw length; pectoral filaments 3 or 4, not extending beyond level of posterior tip of pelvic fin; caudal fin deeply forked, but upper and lower caudal-fin lobes not filamentous. Pored lateral-line scales 71 to 95; scale rows above lateral line 8 to 14, below 12 to 17. Gillrakers 2 to 8 on upper limb, 2 to 10 on lower limb, 4 to 18 total; gillrakers on anterior parts of upper and lower limbs replaced during fish growth by tooth plates with villiform teeth, each gillraker on both upper and lower limbs becoming shorter with fish growth. Vertebrae 10 precaudal and 15 caudal; supraneural bones 0 to 2. Swimbladder absent.

**Habitat and Biology:** With the exception of ***E. tetradactylum***, no information on habitat and biology for members of the genus has been reported, although the genus comprises 3 species. Information on ***E. tetradactylum*** is given below under the species' account.

**Geographic Distribution:** The genus is distributed in the Indo-West Pacific, but has never been recorded in the Red Sea or off the east coast of Africa (including Madagascar).

**Interest to Fisheries:** The species of ***Eleutheronema***, except ***E. tridactylum***, are among the most important commercial fishes in the Indo-West Pacific, being the highest priced fishes in local fish markets. ***Eleutheronema tridactylum*** is of little commercial importance because of its small size.

**Species:** The genus comprises 3 species:

***Eleutheronema rhadinum***: East Asia, Japan, China and Viet Nam.

***Eleutheronema tetradactylum***: Indo-West Pacific, Persian Gulf to Australia.

***Eleutheronema tridactylum***: Southeast Asia, Thailand to Indonesia.

**Remarks:** Bleeker (1862a) proposed ***Eleutheronema*** (name only) for ***Polynemus tetradactylus***, but gave neither diagnoses nor descriptions of the genus. Subsequently, Bleeker (1862b) described the genus in detail, including the following characters: body oblong, compressed; scales very small (around 70 in lateral line); lip absent except in corner of lower jaw; vomer, palatines and ectopterygoids with teeth; posterior margin of preopercle serrated; pectoral filaments 3 or 4; anal-fin rays 15 to 17. Two species, ***Polynemus tetradactylus*** and ***Polynemus tridactylus***, were included by Bleeker (1862b).

Feltes (1993) redefined the genera of the family Polynemidae, including a key, and suggested that the posterior extension of tooth plates from the lateral margins of the primary vomerine tooth plate was diagnostic for ***Eleutheronema***. However, this character is not found in ***E. tridactylum*** at any life stage and in juveniles (less than about 70 mm standard length) of ***E. tetradactylum***. Therefore, the character should be not treated as diagnostic for the genus. The genus was recently redefined by Motomura *et al.* (2002a).

## Key to the Species of *Eleutheronema*

**1a.** Pectoral filaments 3; vomer without tooth plates on either side throughout life (Fig. 31a); second dorsal-fin soft rays 13 (rarely 14); gillrakers 4 to 10 (mode 8) (Fig. 32, Plate Ic) . . . ***Eleutheronema tridactylum*** (Thailand to Indonesia)

**1b.** Pectoral filaments 4; vomer with deciduous tooth plates on both sides (Fig. 31b), except in juveniles (less than about 70 mm standard length); second dorsal-fin soft rays 14 (rarely 13 or 15); gillrakers 6 to 18 (mode 12 or 13) . . . . . → *2*

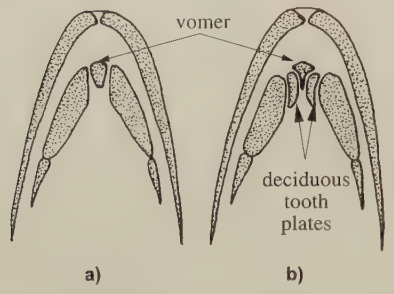



**Fig. 31 Ventral view of dentition of premaxilla and roof of oral cavity of a) *E. tridactylum* and b) *E. tetradactylum***
(from Motomura *et al.*, 2002a)

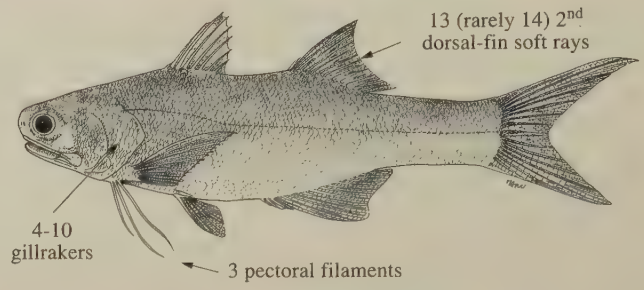



**Fig. 32 *Eleutheronema tridactylum***

**2a.** Pored lateral-line scales 82 to 95; 11 to 14 (mode 12) scale rows above lateral line, 15 to 17 (16) below; pectoral-fin membranes black when fresh (Fig. 33, Plate Ia) . . . . . ***Eleutheronema rhadinum*** (Japan, China and Viet Nam)

**2b.** Pored lateral-line scales 71 to 80; 9 to 12 (mode 10) scale rows above lateral line, 13 to 15 (14) below; pectoral-fin membranes vivid yellow when fresh, except in large specimens (over about 350 mm standard length) (Fig. 34, Plate Ib) . . . . . ***Eleutheronema tetradactylum*** (Persian Gulf to Australia)

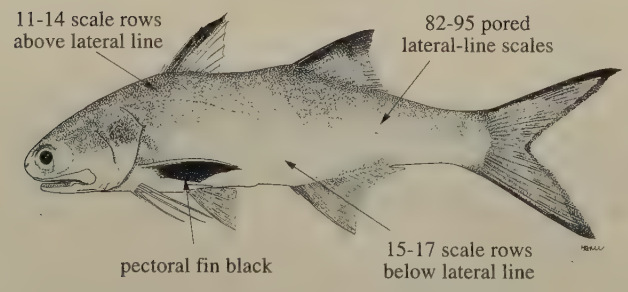

11-14 scale rows above lateral line
82-95 pored lateral-line scales
pectoral fin black
15-17 scale rows below lateral line

**Fig. 33 *Eleutheronema rhadinum***

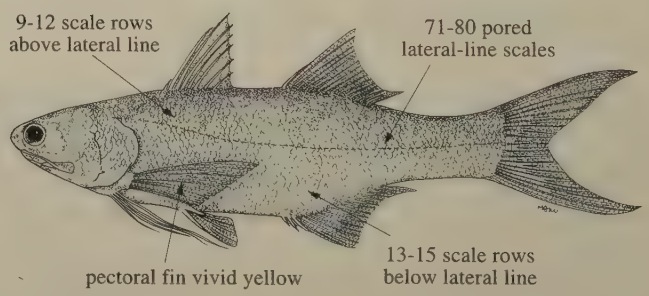

9-12 scale rows above lateral line
71-80 pored lateral-line scales
pectoral fin vivid yellow
13-15 scale rows below lateral line

**Fig. 34 *Eleutheronema tetradactylum***

## *Eleutheronema rhadinum* (Jordan and Evermann, 1902) Fig. 35; Plate Ia

*Polydactylus rhadinus* Jordan and Evermann, 1902: 351, fig. 20 [type locality: Taiwan Province, China; neotype (ASIZP 60745, 152 mm standard length) designated by Motomura *et al.*, 2002a].

**Synonyms:** None.

**FAO Names: En** - East Asian fourfinger threadfin; **Fr** - Barbure à quatre doigts d'Asie; **Sp** - Barbudo cuatro dedos de Asia.

**Fig. 35** ***Eleutheronema rhadinum***

**Diagnostic Features:** A large species. Body elongate, body depth at first dorsal-fin origin 23 to 27% (mean 24%) of standard length; head length 28 to 30% (mean 29%) of standard length. Posterior margin of maxilla extending well beyond level of posterior margin of adipose eyelid; upper-jaw length 15 to 16% (mean 16%) of standard length; depth of posterior margin of maxilla 3% of standard length; anterior parts of lower jaw with small teeth extending onto lateral surface, adjacent portion of lip absent; tooth plate extension onto lateral surface of lower jaw 8 to 9% (mean 8%) of standard length; teeth villiform in broad bands on vomer, palatines and ectopterygoids; vomer with deciduous tooth plates on both sides; ectopterygoids and 2 deciduous tooth plates becoming wider and larger, respectively, with continued fish growth. Posterior margin of preopercle serrated. First dorsal fin with VIII spines, all spine bases of similar thickness (base of second spine slightly more robust than others in large specimens); second dorsal fin with I spine and 14 (rarely 13 or 15) soft rays; anal fin with III spines and 14 to 16 (mode 15) soft rays, anal-fin base longer than second dorsal-fin base; pectoral fin with 17 or 18 (mode 18, rarely 19) unbranched rays, its length 20 to 22% (mean 21%) of standard length, posterior tip just short of level of posterior tip of pelvic fin; pectoral filaments 4, first filament shortest, not reaching to level of pelvic-fin origin; second filament extending slightly (or well) beyond level of pelvic-fin origin; third filament extending beyond (or just short of) level of pelvic-fin origin; fourth filament longest, its length 15 to 27% (mean 21%) of standard length, not reaching to level of posterior tip of pectoral fin; caudal fin deeply forked, upper and lower caudal-fin lobes not filamentous, upper caudal-fin lobe 32 to 38% (mean 35%) and lower lobe 29 to 36% (mean 33%) of standard length. Pored lateral-line scales 82 to 95 (mode 95); lateral line simple, extending from upper end of gill opening to upper end of lower caudal-fin lobe, or bifurcating on caudal-fin base, upper branch extending to lower end of upper caudal-fin lobe and lower branch secondarily bifurcating on middle of lower caudal-fin lobe; scale rows above lateral line 11 to 14 (mode 12), below 15 to 17 (mode 16). Gillrakers 5 to 8 (mode 5) on upper limb, 5 to 9 (mode 7) on lower limb, 10 to 17 (mode 12) total; gillrakers on anterior parts of upper and lower limbs replaced during fish growth by tooth plates with villiform teeth, each gillraker on both upper and lower limbs becoming shorter with fish growth. Vertebrae 10 precaudal and 15 caudal; supraneural bones 1 to 2. Swimbladder absent. **Colour:** Upper sides of head and trunk with slight darkish silver tinge, becoming lighter on lower sides; anterior margins of first and second dorsal fins blackish, remaining parts translucent and slightly blackish, respectively (both fins uniform dense black in large fish); pectoral fin dense black; pectoral filaments white; pelvic fin white; base of anal fin slightly yellowish, other parts white (pelvic fin uniformly black in large fish); base and posterior margin of caudal fin yellowish and dense black, respectively, other parts blackish.

**Geographical Distribution:** Distributed in East Asia (Japan, China and Viet Nam), being endemic to that area (Fig. 36). The species generally occurs on continental shelves (Chinese mainland, Taiwan Province of China, Japanese mainland), having at no time been reported from the vicinity of oceanic islands (e.g. Ryukyu Islands and Ogasawara Islands). The record from Japan is based only on a single large specimen (MUFS 18880, 923 mm total length) from Aomori, northernmost Honshu Island.

**Habitat and Biology:** No data are available.

**Size:** Maximum standard length at least 739 cm (Motomura, Senou and Iwatsuki, 2001; Motomura *et al.*, 2002a).

**Interest to Fisheries:** Reliable fishery information for the species is not available.

**Local Names:** CHINA: Shi-jih-ma-fa-yu; JAPAN: Minami-konoshiro; TAIWAN PROVINCE OF CHINA: Shi-jih-ma-fa-yu; Gor-ah.

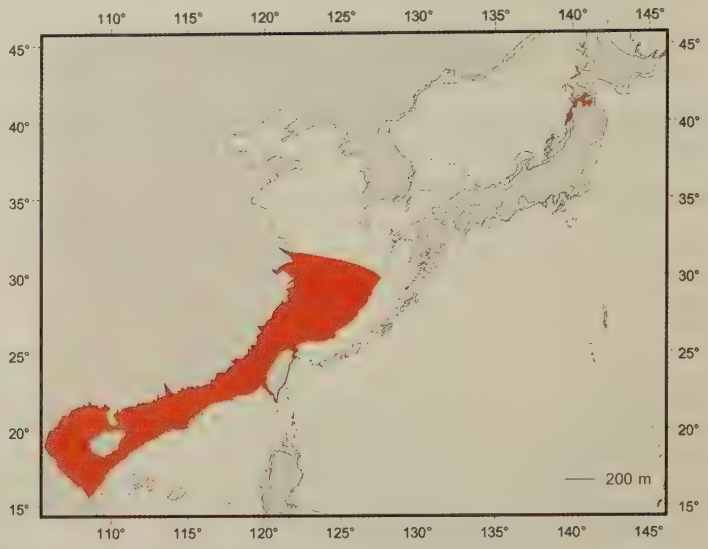



**Fig. 36** ***Eleutheronema rhadinum***
Known distribution

**Literature:** Motomura, Senou and Iwatsuki (2001, as ***Eleutheronema tetradactylum***); Motomura *et al.*, 2002a; Motomura (2003b).

**Remarks:** ***Polydactylus rhadinus*** was described by Jordan and Evermann (1902) from Taiwan Province of China, China, on the basis of a single specimen (273 mm total length) which has apparently been lost [a neotype was designated by Motomura *et al.* (2002a)]. Since the original description, the species has been treated as a junior synonym of ***Eleutheronema tetradactylum*** (e.g. Weber and de Beaufort, 1922; Herre, 1953; Kagwade, 1970). However, ***E. rhadinum*** is clearly distinguished from the latter by the number of pored lateral-line scales (82 to 95 versus 71 to 80 in the latter) and coloration of pectoral-fin membranes (black versus vivid yellow when fresh), although proportional measurements of the 2 species are similar. Accordingly, ***E. rhadinum*** was recently regarded as a valid species by Motomura *et al.* (2002a).

***Eleutheronema rhadinum*** differs from ***Eleutheronema tridactylum*** by having vomer with 2 deciduous tooth plates in specimens at least over ca. 70 mm standard length (vs. vomer without tooth plates in the latter) and higher counts of second dorsal-fin soft rays [14 (rarely 13 or 15, 3 of 19 specimens) versus 13 (rarely 14, 1 of 34 specimens)], pectoral filaments (4 versus 3) and gillrakers [10 to 17 (mode 12) versus 4 to 10 (mode 8)]. Furthermore, ***E. rhadinum*** tends to have a slightly deeper posterior margin of the maxilla (3% of standard length) and a slightly shorter tooth plate on the lateral surface of the lower jaw [8 to 9% (mean 8%) of standard length] than ***E. tridactylum*** [2 to 3% (mean 2%) and 9 to 10% (mean 9%) of standard length, respectively], although the proportional length measurements overlapped among the 2 species.

## ***Eleutheronema tetradactylum*** (Shaw, 1804)

**Fig. 37; Plate Ib**

***Polynemus tetradactylus*** Shaw, 1804: 155 [original locality: Vizagapatnam, India, based on "Maga Jellee" of Russell, 1803: 67, fig. 183; type locality: Gariahat, Calcutta, India, based on a neotype (NSMT-P 60912, 189 mm standard length) designated by Motomura *et al.*, 2002a].

**Synonyms:** ***Polynemus teria*** Hamilton, 1822: 224 (type locality: estuaries of Ganges River, India; no types known, see Motomura *et al.*, 2002a). ***Polynemus coecus*** Macleay, 1878: 354, pl. 9, fig. 1 [type locality: Darwin, Northern Territory, Australia; 2 syntypes (AMS I. 9791, 369 mm standard length; AMS I. 16295-001, 360 mm standard length)].

**FAO Names: En** - Fourfinger threadfin; **Fr** - Barbure à quatre doigts; **Sp** - Barbudo de cuatro dedos.

**Fig. 37** ***Eleutheronema tetradactylum***

**Diagnostic Features:** A large species. Body elongate, body depth at first dorsal-fin origin 23 to 27% (mean 25%) of standard length; head length 28 to 31% (mean 29%) of standard length. Posterior margin of maxilla extending well beyond level of posterior margin of adipose eyelid; upper-jaw length 14 to 17% (mean 15%) of standard length; depth of posterior margin of maxilla 3 to 4% (mean 3%) of standard length; anterior parts of lower jaw with small teeth extending onto lateral surface, adjacent portion of lip absent; tooth plate extension onto lateral surface of lower jaw 7 to 9% (mean 8%) of standard length; teeth villiform in broad bands on vomer, palatines, and ectopterygoids; vomer with deciduous tooth plates on both sides, except in juveniles (less than about 70 mm standard length); ectopterygoids and 2 deciduous tooth plates becoming wider and larger, respectively, with continued fish growth. Posterior margin of preopercle serrated. First dorsal fin with VIII spines, all spine bases of similar thickness (second spine slightly more robust than others in large specimens, over about 300 mm standard length); second dorsal fin with I spine and 14 (rarely 13 or 15) soft rays; anal fin with III spines and 14 to 16 (mode 15) soft rays, anal-fin base longer than second dorsal-fin base; pectoral fin with 16 or 18 (mode 17, rarely 15 or 19) unbranched rays, its length 20 to 23% (mean 21%) of standard length, posterior tip just short of level of posterior tip of pelvic fin; pectoral filaments 4, first filament shortest, not reaching to level of pelvic-fin origin; second filament extending slightly (or well) beyond level of pelvic-fin origin; third filament (rarely longest) extending beyond level of pelvic-fin origin; fourth filament longest, its length 15 to 28% (mean 24%) of standard length, reaching to (not reaching or extending slightly beyond) level of posterior tip of pectoral fin; caudal fin deeply forked, upper and lower caudal-fin lobes not filamentous, upper caudal-fin lobe 30 to 38% (mean 34%) and lower lobe 26 to 36% (mean 32%) of standard length. Pored lateral-line scales 71 to 80 (mode 73); lateral line simple, extending from upper end of gill opening to upper end of lower caudal-fin lobe, or bifurcating on caudal-fin base, upper branch extending to lower end of upper caudal-fin lobe and lower branch secondarily bifurcating on middle of lower caudal-fin lobe; scale rows above lateral line 9 to 12 (mode 10), below 13 to 15 (mode 14). Gillrakers 3 to 8 (mode 6) on upper limb, 3 to 10 (mode 7) on lower limb, 6 to 18 (mode 13) total; gillrakers on anterior parts of upper and lower limbs replaced during fish growth by tooth plates with villiform teeth, each gillraker on both upper and lower limbs becoming shorter with fish growth. Vertebrae 10 precaudal and 15 caudal; supraneural bones 1 to 2. Swimbladder absent. **Colour:** Upper sides of head and trunk with slight darkish silver tinge, becoming lighter on lower sides; anterior margins of first and second dorsal fins blackish, remaining parts translucent and slightly blackish, respectively; pectoral fin vivid yellow (dusky yellow in large specimens over about 350 mm standard length); pectoral filaments white; anterior margin of pelvic fin yellow, other parts white; base of anal fin yellow, other parts yellowish white; base of caudal fin yellowish, other parts blackish.

**Geographical Distribution:** Distributed in the Indo-West Pacific where it ranges from the Persian Gulf to Papua New Guinea and northern Australia (from mouth of Ashburton River, Western Australia to mouth of Mary River, Queensland) (Fig. 38). The species is not known from East Asia (where it is replaced by the endemic ***E. rhadinum***).

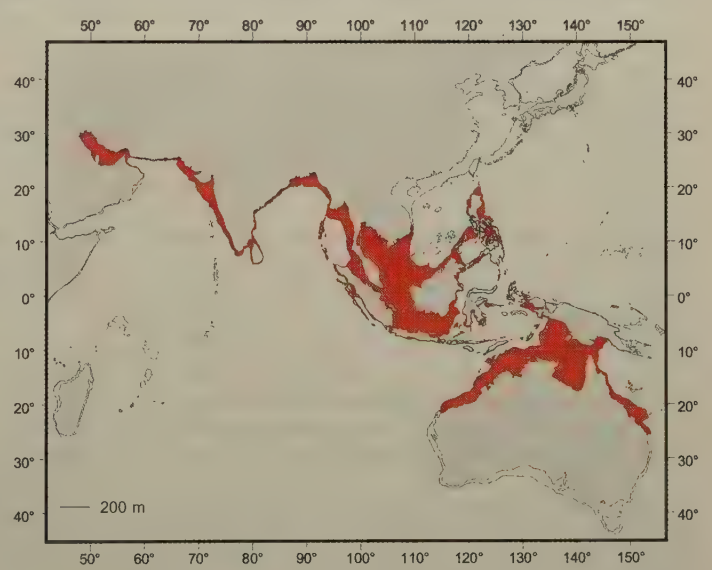



**Fig. 38** ***Eleutheronema tetradactylum***
Known distribution

**Habitat and Biology:** Generally occurs on continental shelves on muddy and sandy substrata, and frequently enters brackish waters, especially as juveniles. According to Malhotra (1953), larvae from 7 to 30 mm total length feed mainly on copepods and mysids, shrimps and prawn larvae having secondary importance as prey. Juveniles (31 to 60 mm total length) feeds mainly on prawns, shrimps and mysids, and adult fish prey on other fishes, including mugilids, sillaginids and sciaenids, and sometimes smaller conspecifics.

Patnaik (1967) referred to the occurrence of hermaphroditism in 2 examples (404 and 405 mm total length) of the species collected from Chilka Lake, India, and Stanger (1974) studied sexuality and growth of the species in Australian waters. ***Eleutheronema tetradactylum*** grows very rapidly during the first 6 months. At 1 year old, the species averages 300 mm fork length, and at 3 years old, 450 mm fork length. Males range from 240 to 470 mm fork length, hermaphrodites from 250 to 460 mm fork length, and females from 280 to 720 mm fork length. On the northeast coast of Queensland, Australia, most specimens reported (from 450 to 500 mm fork length) were females. Hermaphroditism develops in 1- to 2-year-old fishes, females first appearing as 2- to 3-year-olds. According to Stanger (1974), males probably commence sex reversal immediately after spawning, the condition possibly persisting until after the next spawning period. The progression from hermaphrodite to female is completed by the following season.

In waters off Townsville, Queensland, Australia, spawning begins in late October (Stanger, 1974), specimens collected from the northeast coast of Queensland in November and December having either recently spawned or being ready to spawn (Kailola and Stewart *in* Kailola *et al.*, 1993). Although the species spawns only once each year in Queensland waters (Stanger, 1974), in the northern Arabian Sea, 2 peak spawning periods occur, during January to April and July to September (Karandikar and Palekar, 1950).

Kagwade (1970) believed that the species first matures at a total length of between 360 and 390 mm in Indian waters. Earlier, Karandikar and Palekar (1950) had described ova sizes in the species from India: immature ovaries contained ova measuring up to 0.4 mm diameter, maturing ovaries with ova between 0.45 and 0.68 mm diameter, and mature ovaries with ova between 0.7 and 1.0 mm diameter. Oil globules in the mature ova measured 0.25 to 0.30 mm diameter. Sarojini and Malhotra (1952) traced the development of larvae of the species from 6.0 mm until the juvenile phase. The swimbladder, well developed in larvae, had become vestigial in juveniles and adults. Body scales were apparent on larvae of about 15 mm.

**Size:** Maximum total length about 2 m; weight 145 kg (Kailola and Stewart *in* Kailola *et al.*, 1993).

**Interest to Fisheries:** One of the most important fisheries species for Kuwait, India, Thailand, Viet Nam, Malaysia, Singapore and Indonesia, and is also a significant component of fisheries off Bangladesh, Myanmar, Cambodia and northern Australia. The species is mainly caught by gill net, sometimes by trawl, averaging about 3% of the total landings in the gill net fishery in the Gulf of Carpentaria, Australia, between 1980 and 1987 (Kailola and Stewart *in* Kailola *et al.*, 1993). The species is also an important sport fish in Australian waters, being caught by rod and reel or handlines. In Queensland, Australia, the fishery for the species is significant from Port Douglas to Gladstone on the east coast, as well as in the Gulf of Carpentaria around the ports of Weipa and Karumba (Kailola and Stewart *in* Kailola *et al.*, 1993).

**Local Names:** AUSTRALIA: Blue threadfin, Blue salmon, Cooktown salmon, Rockhampton salmon, Giant threadfin, Colonial salmon, Blunt-nosed salmon, Blind tassel-fish, Bluenose salmon; BANGLADESH: Tailla; CAMBODIA: Trey pream; INDIA: Salliah, Saccolih; INDONESIA: Baling, Kesumbang, Kurau, Lausan, Sumbal; ISLAMIC REPUBLIC OF IRAN: Rashgoo; KUWAIT: Sheem; MALAYSIA: Genohong, Ikan salangan, Jenohong, Jubal senohong, Kubal, Kurau, Kurau janggut, Kuru janggut, Mancong, Senangin, Senohong, Sinanghi, Selanghi; MYANMAR: Kakuyan, Nga-let-kwa, Za yaw gyi; PHILIPPINES: Bikau, Hugao, Hugau, Kagau, Kugao, Mamali, Pugao; SRI LANKA: Kalawa, Kalemeen, Pozhakkala, Yevakala; VIET NAM: Cá chét.

**Literature:** Motomura *et al.* (2002a).

**Remarks:** ***Eleutheronema tetradactylum*** was originally proposed by Shaw (1804) as ***Polynemus tetradactylus*** for the "Maga Jellee" of Russell (1803), whose description of the species included a figure (fig. 183), but lacked a formal scientific name and gave no indication of any type specimens. Subsequently, Hamilton (1822) overlooked Shaw's (1804) description and described ***Polynemus teria*** from estuaries of the Ganges River, India, stating it to be the same species as Russell's (1803) "Maga Jellee." The description of ***P. teria*** also failed to identify any type specimens. In fact, the present whereabouts of all of Hamilton's (1822) types, including the type of ***P. teria***, are unknown; they are not held in BMNH or other British or Indian museums (Hora, 1929). ***Polynemus teria*** is clearly justified as a junior synonym of ***E. tetradactylum*** because "4 pectoral filaments" were included in the original description of ***P. teria*** which is consistent with the pectoral filament condition in ***E. tetradactylum***. Also, Hamilton (1822) considered ***P. teria*** to be the same as Russell's (1803) "Maga Jellee" (= ***E. tetradactylum***).

***Polynemus coecus*** was described by Macleay (1878) from Darwin, Northern Territory, Australia, on the basis of 2 specimens. Examination of these syntypes (AMS I. 9791 and I. 16295-001) showed them both to be conspecific with ***E. tetradactylum***. Their meristic and morphological characters are included in Motomura *et al.* (2002a: table 2).

Günther (1860), Day (1876) and Weber and de Beaufort (1922) reported ***Polynemus salliah*** Cantor, 1838 as a junior synonym of ***Polynemus tetradactylus*** or ***E. tetradactylum***. However, Cantor (1838) wrote only "To the genus ***Polynemus***, I shall add a species, called by the natives Salliah, or Saccolih," not following the Principles of Binominal Nomenclature (Article 5.1, ICZN-1999). Furthermore, when Cantor's (1838) "Salliah or Saccolih" was first reported as a scientific name (***Polynemus salliah*** Cantor, 1838), it was treated as a junior synonym of ***Polynemus tetradactylus***, then considered to be

valid. Accordingly, ***Polynemus salliah*** is not available under Articles 11.4 and 11.6 (ICZN-1999) (see Motomura, Senou and Iwatsuki, 2001; Motomura *et al.*, 2002a).

***Eleutheronema tetradactylum*** previously reported from East Asia (e.g. Shen, 1984; Motomura, Senou and Iwatsuki, 2001) is now identified as ***E. rhadinum***.

Two patterns of lateral-line squamation on the caudal-fin membrane exist in ***E. tetradactylum***. The lateral line of ***E. tridactylum*** is unbranched, extending from the upper end of the gill opening to the upper end of the lower caudal-fin lobe, whereas it is either branched or unbranched in ***E. tetradactylum***. All specimens (18 specimens examined by the author) of ***E. tetradactylum*** collected from northern and eastern Australia, and southern Papua New Guinea had unbranched lateral lines, whereas all specimens (93 specimens examined by the author), except 2 specimens, of that from other localities had the lateral line divided into 3 lines on the caudal-fin membrane (see Motomura *et al.*, 2002a: fig. 7). Although in ***E. tetradactylum***, the relative frequency of specimens with an unbranched lateral line ranged from 100% (from Australia and Papua New Guinea) to 2% (from other localities), there were no other differences apparent. Therefore, the differences in lateral-line squamation are believed to represent intraspecific (geographic) variation. A single example with the lateral line divided into 4 lines on the caudal-fin membrane was observed by the author at Mangalore central fish market in Mangalore, Karnataka, India, but the specimen was not retained because of its large size (about 1.5 m standard length). The existence of 3 or 4 (the latter a malformation?) branches of the lateral line on the caudal-fin membrane of some ***E. tetradactylum*** is unique among polynemids, although bifurcation of the lateral line on the caudal-fin base is known in some ***Polydactylus*** species, e.g., ***P. approximans***, ***P. bifurcus*** and ***P. virginicus***. Other members of polynemids have an unbranched lateral line, extending to the upper end of the lower caudal-fin lobe, the lower end of the upper caudal-fin lobe or the middistal margin of the caudal-fin membrane.

## ***Eleutheronema tridactylum*** (Bleeker, 1849) **Fig. 39; Plate Ic**

***Polynemus tridactylus*** Bleeker, 1849: 57 [type locality: Jakarta, Java, Indonesia; holotype (RMNH 6012, 255 mm standard length) determined from 11 Bleeker specimens by Motomura *et al.*, 2002a].

**Synonyms:** None.

**FAO Names: En** - Threefinger threadfin; **Fr** - Barbure à trois doigts; **Sp** - Barbudo de tres dedos.

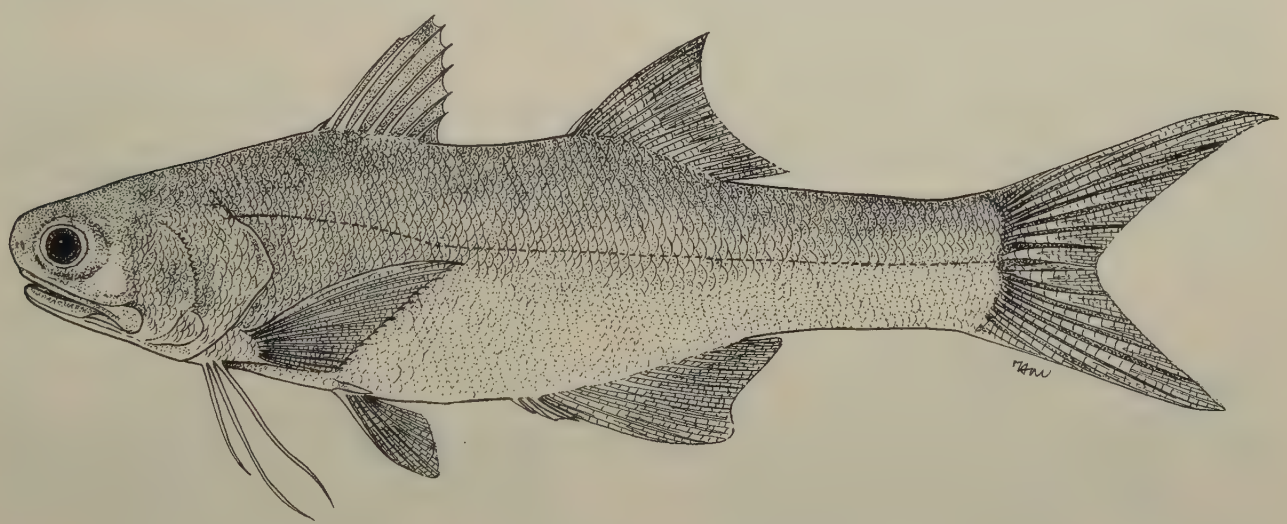


**Fig. 39** ***Eleutheronema tridactylum***

**Diagnostic Features:** A medium-sized species. Body elongate, body depth at first dorsal-fin origin 22 to 27% (mean 24%) of standard length; head length 26 to 30% (mean 28%) of standard length. Posterior margin of maxilla extending well beyond level of posterior margin of adipose eyelid; upper-jaw length 14 to 16% (mean 15%) of standard length; depth of posterior margin of maxilla 2 to 3% (mean 2%) of standard length; anterior parts of lower jaw with small teeth extending onto lateral surface, adjacent portion of lip absent; tooth plate extension onto lateral surface of lower jaw 9 to 10% (mean 9%) of standard length; teeth villiform in broad bands on vomer, palatines and ectopterygoids; vomer lacking deciduous tooth plates on both sides throughout life; ectopterygoids becoming wider with continued fish growth. Posterior margin of preopercle serrated. First dorsal fin with VIII spines, all spine bases of similar thickness; second dorsal fin with I spine and 13 (rarely 14) soft rays; anal fin with III spines and 14 or 15 (mode 15) soft rays, anal-fin base longer than second dorsal-fin base; pectoral fin with 16 to 18 (mode 17) unbranched rays, its length 21 to 23% (mean 22%) of standard length, posterior tip just short of

level of posterior tip of pelvic fin; pectoral filaments 3, first filament shortest, reaching to (or extending slightly beyond) level of pelvic-fin origin; second filament extending well beyond level of pelvic-fin origin; third filament longest, its length 21 to 29% (mean 25%) of standard length, not reaching to level of posterior tip of pectoral fin; caudal fin deeply forked, upper and lower caudal-fin lobes not filamentous, upper caudal-fin lobe 29 to 37% (mean 34%) and lower lobe 25 to 33% (mean 30%) of standard length. Pored lateral-line scales 72 to 79 (mode 75); lateral line simple, extending from upper end of gill opening to upper end of lower caudal-fin lobe; scale rows above lateral line 8 to 10 (mode 9), below 12 to 16 (mode 14). Gillrakers 2 to 4 (mode 3) on upper limb, 2 to 6 (mode 5) on lower limb, 4 to 10 (mode 8) total; gillrakers on anterior parts of upper and lower limbs replaced during fish growth by tooth plates with villiform teeth, each gillraker on both upper and lower limbs becoming shorter with fish growth. Vertebrae 10 precaudal and 15 caudal; supraneural bones 0 to 2. Swimbladder absent. **Colour:** Upper sides of head and trunk green, becoming silvery white or yellowish white on lower sides; dorsal, pectoral, and caudal fins dark with black borders.

**Geographical Distribution:** Currently known from Thailand (Gulf of Thailand and Phuket Island, Andaman Sea), Malaysia (Malay Peninsula and Sarawak, Kalimantan) and Indonesia (Sumatra, Java, Kalimantan and Moluccas) (Fig. 40).

**Habitat and Biology:** No data are available.

**Size:** Maximum standard length at least 25 cm (Motomura *et al.*, 2002a).

**Interest to Fisheries:** Of little commercial importance because the population of the species appears to be too small. The species has been taken with ***E. tetradactylum***.

**Local Names:** INDONESIA: Suro.

**Literature:** Feltes *in* Carpenter and Niem (2001); Motomura *et al.* (2002a).

**Remarks:** Initially, Bleeker (1845) gave only the name "***Polynemus tridactijlus***," there being no distinguishing features included. However, the species was later described in detail by Bleeker (1849) on the basis of a single specimen, about 350 mm total length which represents the largest confirmed record of the species.

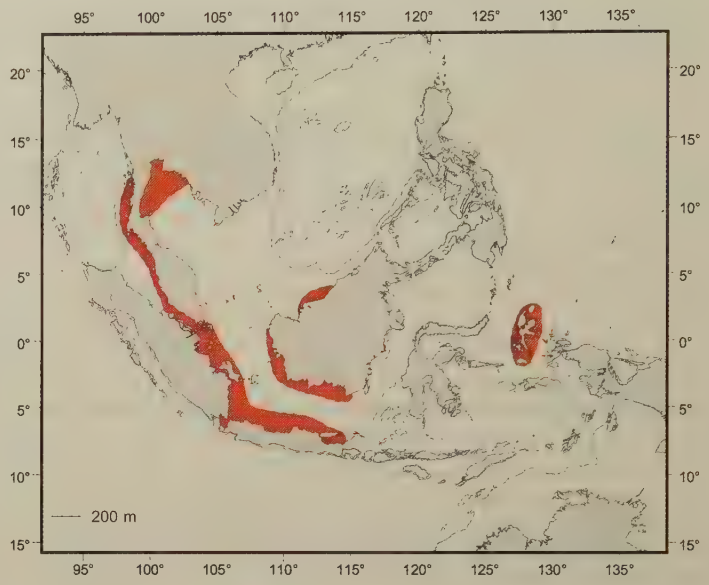



**Fig. 40** ***Eleutheronema tridactylum***
Known distribution

***Eleutheronema tridactylum*** is easily distinguished from both ***E. rhadinum*** and ***E. tetradactylum*** by having vomer without tooth plates (versus vomer with 2 deciduous tooth plates in ***E. rhadinum*** and ***E. tetradactylum***) and lower counts of second dorsal-fin soft rays [13 (rarely 14) versus 14 (rarely 13 or 15 in ***E. rhadinum*** and ***E. tetradactylum***)], pectoral filaments (3 versus 4 in ***E. rhadinum*** and ***E. tetradactylum***) and gillrakers [4 to 10 (mode 8) versus 10 to 17 (mode 12) and 6 to 18 (mode 13) in ***E. rhadinum*** and ***E. tetradactylum***, respectively].

## ***Filimanus*** Myers, 1936

***Filimanus*** Myers, 1936: 379 [type species: ***Polynemus melanochir*** (not of Valenciennes): Myers, 1936 (later described as ***Filimanus perplexa*** Feltes, 1991)].

**Synonyms:** None.

**Diagnostic Features:** Body oblong to moderately deep, compressed. Adipose eyelid well developed; eye diameter greater than snout length. Lip on lower jaw well developed and dentary teeth restricted to dorsal surface; width of tooth band on upper and lower jaws less than space (on symphysis) separating tooth bands on opposing premaxillae; teeth villiform in narrow bands on jaws, palatines and ectopterygoids, tooth plates on palatines shorter than those on ectopterygoids; vomer with inconspicuous tooth plate. Posterior margin of maxilla extending beyond level of posterior margin of adipose eyelid. Posterior margin of preopercle serrated. Basisphenoid not in contact with prootic; sphenotics not visible dorsally between anterior margins of parietal and pterotic. First dorsal fin with VIII spines; second dorsal fin with I spine and 11 to 13 soft rays; anal fin with III spines and 10 to 15 soft rays; anal-fin base less than head length; pectoral fin with 13 to 16 rays, all unbranched; pectoral-fin insertion well below midline of body; pectoral-fin base (including base of pectoral filaments) less than upper-jaw length; pectoral filaments 5 to 8, not extending beyond level of posterior tip of caudal fin; caudal fin deeply forked, but upper and lower caudal-fin lobes not filamentous. Pored lateral-line scales 43 to 52; scale rows above lateral line 5 to 8, below 9 to 12. Gillrakers 35 to 49. Vertebrae 10 precaudal and 14 caudal; supraneural bones 2 or 3.

**Habitat and Biology:** *Filimanus* species are usually found in 1 to 80 m on open sandflats and muddy substrates. They frequently enter estuaries and are mostly taken in trawls.

**Geographic Distribution:** The genus is distributed in the Indo-West Pacific where it ranges from Pakistan to the Philippines, Papua New Guinea and the Solomon Islands.

**Interest to Fisheries:** Because of their small size, *Filimanus* species are generally of little commercial importance.

**Species:** The genus comprises 6 species:

*Filimanus heptadactyla*: Western Pacific, Thailand to Papua New Guinea.

*Filimanus hexanema*: Java, Indonesia.

*Filimanus perplexa*: Andaman Sea to western Indonesia.

*Filimanus sealei*: Western Pacific, Philippines to Solomon Islands.

*Filimanus similis*: Indian Ocean, Pakistan to Andaman Sea.

*Filimanus xanthonema*: East coast of India to western Indonesia.

**Remarks:** Myers (1936) described *Filimanus* as a new genus on the basis of a single specimen (USNM 72742, 114 mm standard length), but had misidentified the latter as *Polynemus melanochir* Valenciennes *in* Cuvier and Valenciennes, 1831. *Polynemus melanochir* is, in fact, a valid species belonging to *Polynemus*, the specimen used by Myers (1936) in his description of *Filimanus* representing an undescribed species, subsequently described by Feltes (1991) as *F. perplexa* [based on 26 specimens (68 to 157 mm standard length), including the specimen used in the original description of *Filimanus*]. In Opinion 1761 (ICZN) established *F. perplexa* as the type species of *Filimanus*. Feltes (1991) included 5 species in *Filimanus* in addition to the type species.

## Key to the Species of *Filimanus*

**1a.** Pectoral filaments extending well beyond level of midpoint of anal-fin base; anal-fin soft rays 13 to 15 (mode 14) . . . . . → *2*

**1b.** Pectoral filaments not extending beyond level of midpoint of anal-fin base; anal-fin soft rays 10 to 12 (mode 11). . . . . → *3*

**2a.** Pectoral filaments 6; body depth at first dorsal-fin origin 29 to 32% (mean 30%) of standard length (Fig. 41, Plate Ie) . . . . . ***Filimanus hexanema*** (Java, Indonesia)

**2b.** Pectoral filaments 7; body depth at first dorsal-fin origin 32 to 37% (mean 36%) of standard length (Fig. 42, Plate If). . . . . ***Filimanus perplexa*** (Andaman Sea to western Indonesia)

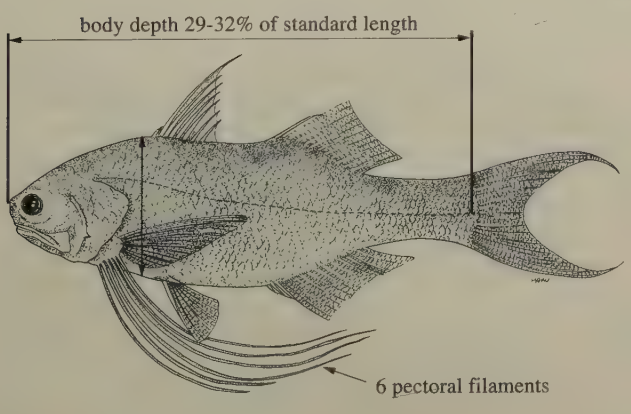



**Fig. 41** ***Filimanus hexanema***

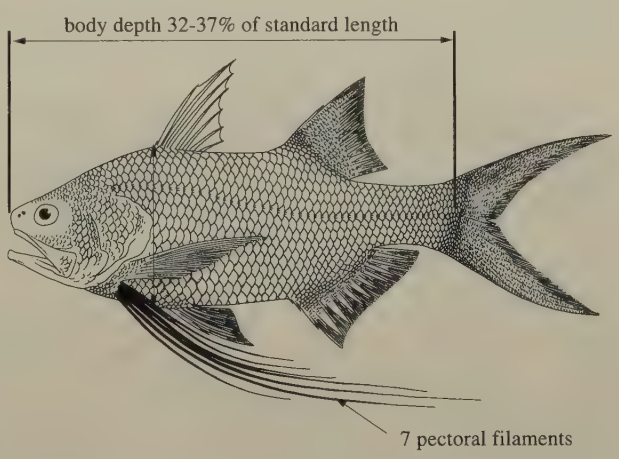



**Fig. 42** ***Filimanus perplexa***

**3a.** Pectoral filaments 8 (rarely 7); gillrakers 40 to 48 (mode 46) (Fig. 43, Plate Ig) . . . . . ***Filimanus sealei***
(Philippines to Solomon Islands)

**3b.** Pectoral filaments 6 or 7 (rarely 5); gillrakers 35 to 49. . . . . → *4*

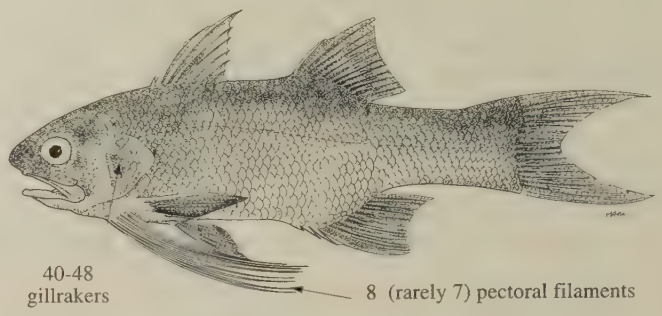



**Fig. 43** ***Filimanus sealei***

**4a.** Pectoral filaments 6 (occasionally 5), or asymmetrically 5 and 6, or 6 and 7; gillrakers 36 to 46 (mode 41) (Fig. 44, Plate IIa) . . . . . ***Filimanus xanthonema***
(east coast of India to western Indonesia)

**4b.** Pectoral filaments 7 . . . . . → *5*

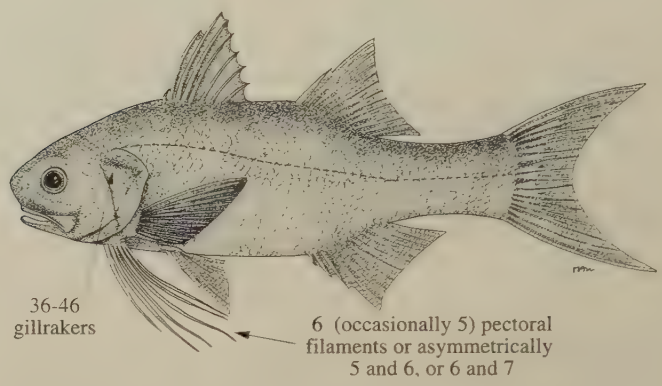



**Fig. 44** ***Filimanus xanthonema***

**5a.** Gillrakers 35 to 41 (mode 39) (Fig. 45, Plate Id) . . . . . ***Filimanus heptadactyla***
(Thailand to Papua New Guinea)

**5b.** Gillrakers 40 to 49 (mode 43) (Fig. 46, Plate Ih) . . . . . ***Filimanus similis***
(Pakistan to Andaman Sea)

**Fig. 45** ***Filimanus heptadactyla***

**Fig. 46** ***Filimanus similis***

## *Filimanus heptadactyla* (Cuvier, 1829) Fig. 47; Plate Id

***Polynemus heptadactylus*** Cuvier *in* Cuvier and Valenciennes, 1829: 390 (type locality: Jakarta, Java, Indonesia, based on a drawing; no types known, see Feltes, 1991).

**Synonyms:** None.

**FAO Names: En** - Sevenfinger threadfin; **Fr** - Barbure à sept doigts; **Sp** - Barbudo de siete dedos.

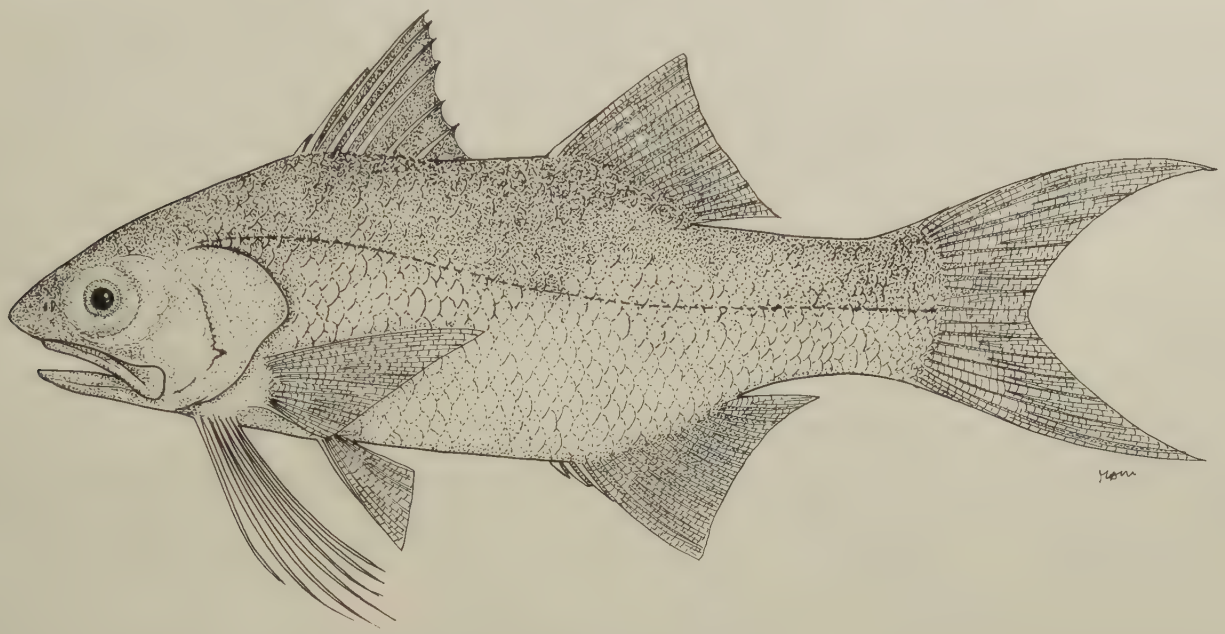


Fig. 47 *Filimanus heptadactyla*

**Diagnostic Features:** A small species. Body depth at first dorsal-fin origin 28 to 33% (mean 31%) of standard length; head length 28 to 33% (mean 31%) of standard length. Snout pointed; occipital profile nearly straight. Posterior margin of maxilla extending beyond level of posterior margin of adipose eyelid; upper-jaw length 14 to 16% (mean 15%) of standard length; depth of posterior margin of maxilla less than eye diameter; lip on lower jaw well developed, dentary teeth restricted to dorsal surface; teeth villiform in narrow bands on palatines and ectopterygoids; vomer with an inconspicuous tooth plate. Posterior margin of preopercle serrated. First dorsal fin with VIII spines, all spine bases of similar thickness; second dorsal fin with I spine and 12 or 13 (mode 12) soft rays; anal fin with III spines and 11 or 12 (mode 11) soft rays, anal-fin base approximately equal to or greater than second dorsal-fin base; pectoral fin with 14 to 16 (mode 15) unbranched rays, its length 23 to 29% (mean 26%) of standard length, posterior tip just short of level of posterior tip of pelvic fin; pectoral filaments 7, first filament shortest, not reaching to level of posterior margin of pelvic fin; third and fourth filaments usually longest, its length 28 to 40% (mean 34%) of standard length, reaching to level of pelvic-fin origin; caudal fin deeply forked, upper and lower caudal-fin lobes not filamentous, upper caudal-fin lobe 28 to 40% (mean 35%) of standard length. Pored lateral-line scales 46 to 49 (mode 48); lateral line simple, extending from upper end of gill opening to mid-distal margin of caudal-fin membrane; scale rows above lateral line 6 or 7 (mode 6), below 9 or 10 (mode 10). Gillrakers (total) 35 to 41 (mode 39). Vertebrae 10 precaudal and 14 caudal; supraneural bones 3. Swimbladder simple.
**Colour:** Upper sides of head and trunk with brown tinge, becoming golden on lower sides; posterior margins of first, second dorsal, anal and caudal fins blackish, remaining areas translucent or yellowish; pectoral fin mostly black; pectoral filaments white or yellowish white; pelvic-fin anterior margin yellow, elsewhere white; anal-fin base yellow, elsewhere yellowish white.

**Geographical Distribution:** Distributed in the western Pacific where it ranges from Thailand, Malaysia (east coast of Malay Peninsula) and Indonesia (Java, Kalimantan, and Moluccas) to Papua New Guinea (Gulf of Papua) (Fig. 48).

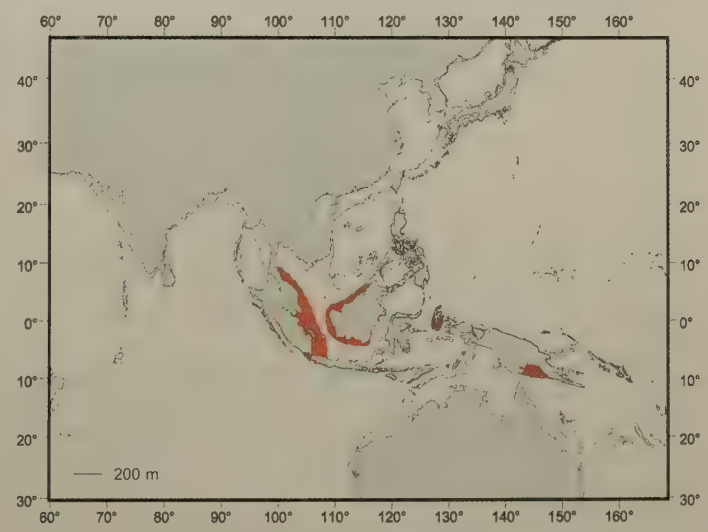



Fig. 48 *Filimanus heptadactyla*
Known distribution

**Habitat and Biology:** See above under genus account. No other data are available.

**Size:** Maximum standard length at least 13 cm (Feltes, 1991).

**Interest to Fisheries:** None.

**Local Names:** INDONESIA: Laas, Laos; PAPUA NEW GUINEA: Seven-fingered threadfin.

**Literature:** Feltes (1991); Feltes *in* Carpenter and Niem (2001).

**Remarks:** ***Polydactylus heptadactylus*** was described as a new species on the basis of a drawing (reproduced *in* Feltes, 1991: 313, fig. 9) from Jakarta, Java, Indonesia. Subsequently, many researchers (e.g. Marathe and Bal, 1958; Nayak, 1959b; Kagwade, 1970) have misidentified ***F. similis***, ***Polydactylus mullani*** and ***P. sextarius*** as ***F. heptadactyla***. ***Polydactylus mullani*** and ***P. sextarius*** can be easily distinguished from ***F. heptadactyla*** by the presence of a large black anterior lateral-line spot (absent in the latter). ***Filimanus heptadactyla***, distributed in the western Pacific, is similar to ***F. similis***, distributed in the eastern Indian Ocean, in having 7 pectoral filaments not reaching to level with the midpoint of the anal-fin base. However, the former differs from ***F. similis*** in having lower gill-raker counts [35 to 41 (mode 39) versus 40 to 49 (mode 43) in the latter].

## *Filimanus hexanema* (Cuvier, 1829)

**Fig. 49; Plate Ie**

***Polynemus hexanema*** Cuvier *in* Cuvier and Valenciennes, 1829: 389 (type locality: Jakarta, Java, Indonesia, based on a drawing; no types known, see Feltes, 1991).

**Synonyms:** ***Polynemus senarius*** Gronow *in* Gray, 1854: 176 [type locality: Indian Ocean, but probably erroneous, see Feltes, 1991; holotype (BMNH 1853.11.12.59, 99 mm standard length)].

**FAO Names: En** - Javanese threadfin; **Fr** - Barbure de Java; **Sp** - Barbudo javanés.

**Fig. 49** ***Filimanus hexanema***

**Diagnostic Features:** A small species. Body depth at first dorsal-fin origin 29 to 32% (mean 30%) of standard length; head length 28 to 31% (mean 29%) of standard length. Snout blunt, interorbital region of frontals not markedly concave. Posterior margin of maxilla extending beyond level of posterior margin of adipose eyelid; upper-jaw length 14 to 15% (mean 15%) of standard length; lip on lower jaw well developed, dentary teeth restricted to dorsal surface; teeth villiform in narrow bands on palatines and ectopterygoids; vomer with an inconspicuous tooth plate lacking teeth. Posterior margin of preopercle serrated. First dorsal fin with VIII spines, all spine bases of similar thickness; second dorsal fin with I spine and 11 or 12 (mode 12) soft rays; anal fin with III spines and 14 soft rays, anal-fin base longer than second dorsal-fin base; pectoral fin with 14 or 15 (mode 14) unbranched rays, its length 31 to 42% (mean 36%) of standard length, posterior tip extending beyond level of posterior tip of pelvic fin (sometimes reaching to level of anal-fin origin); pectoral filaments 6, first filament shortest, just short of level of anal-fin origin; second filament extending beyond level of posterior part of anal-fin base; third and fourth filaments usually longest, its length 66 to 81% (mean 74%) of standard length, extending beyond level of midpoint of anal-fin base (sometimes extending beyond level of midpoint of caudal peduncle); caudal fin deeply forked, upper and lower caudal-fin lobes not filamentous, upper caudal-fin lobe 30 to 42% (mean 34%) of standard length. Pored lateral-line scales 49 or 50 (mode 50); lateral line simple, extending from upper end of gill opening to mid-distal margin of caudal-fin membrane; scale rows above lateral line 6 or 7 (mode 6), below 9 or 10 (mode 10). Gillrakers (total) 43 to 48 (mode 45). Vertebrae 10 precaudal and 14 caudal; supraneural bones 2. **Colour:** Body uniformly silver; posterior margins of first, second dorsal, anal, and caudal fins blackish, remaining parts translucent or yellowish; pectoral fin with scattered melanophores; pectoral filaments white; anterior margin of pelvic fin white, other parts translucent.

**Geographical Distribution:** Known only from western Java, Indonesia (off Jakarta, Serang and Labuhan) (Fig. 50).

**Habitat and Biology:** Nothing has been published on the biology of this rare species.

**Size:** Maximum standard length at least 12 cm (Feltes, 1991).

**Interest to Fisheries:** None.

**Local Names:** None known.

**Literature:** Feltes (1991); Motomura *et al.* (2001a); Feltes *in* Carpenter and Niem (2001).

**Remarks:** ***F. hexanema*** appears to be one of the rarest polynemids. It is similar to ***F. perplexa*** in having long pectoral filaments, extending beyond level with the midpoint of the anal-fin base, but differs from the latter in having lower counts of pectoral filaments (6 versus 7 in the latter) and gillrakers [44 to 48 (mode 45) versus 47 to 55 (mode 50)], and a shallower body depth [29 to 32% (mean 30%) of standard length versus 32 to 37% (mean 36%) of standard length].

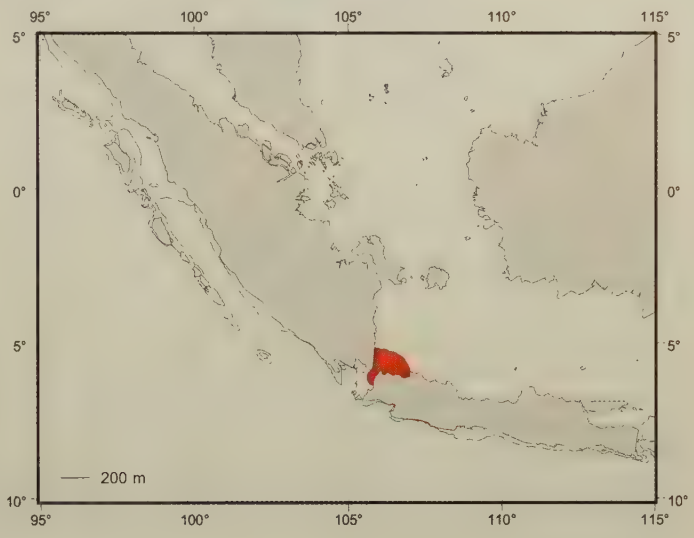



**Fig. 50** ***Filimanus hexanema***
Known distribution

## *Filimanus perplexa* Feltes, 1991

**Fig. 51; Plate If**

***Filimanus perplexa*** Feltes, 1991: 307, fig. 5 [type locality: northwest of Denpasar, Bali, Indonesia; holotype (BMNH 1988.4.6.1, 148 mm standard length); 23 paratypes (BMNH 1988.4.6.2, 155 mm standard length; BMNH 1988.4.6.3, 146 mm standard length; BMNH 1988.4.6.4, 121 mm standard length; BMNH 1988.4.6.5, 156 mm standard length; BMNH 1988.4.6.6, 104 mm standard length; BMNH 1988.4.6.7, 105 mm standard length; BMNH 1988.4.6.8, 148 mm standard length; BMNH 1988.4.6.9, 157 mm standard length; BMNH 1988.4.6.10, 104 mm standard length; CAS 59177, 134 mm standard length; FMNH 97100, 2 specimens, 109 to 118 mm standard length; MCZ 30869, 104 mm standard length; MNHN A. 3054, 68 mm standard length; NMW 12479, 79 mm standard length; NMW 12548, 3 specimens, 84 to 107 mm standard length; NMW 12549, 2 specimens, 71 to 86 mm standard length; NMW 22598, 107 mm standard length; USNM 72742, 114 mm standard length; USNM 280288, 115 mm standard length)].

**Synonyms:** None.

**FAO Names: En** - Splendid threadfin; **Fr** - Barbure magnifique; **Sp** - Barbudo espléndido.

**Fig. 51** ***Filimanus perplexa***

**Diagnostic Features:** A small species. Body moderately deep, body depth at first dorsal-fin origin 32 to 37% (mean 34%) of standard length; head length 30 to 34% (mean 32%) of standard length. Snout blunt, interorbital region of frontals slightly concave. Posterior margin of maxilla extending beyond level of posterior margin of adipose eyelid; upper-jaw length 15 to 18% (mean 17%) of standard length; lip on lower jaw well developed, dentary teeth restricted to dorsal surface; teeth villiform in narrow bands on palatines and ectopterygoids; vomer with an inconspicuous tooth plate. Posterior margin of preopercle serrated. First dorsal fin with VIII spines, second spine slightly more robust than others; second dorsal fin with I spine and 11 soft rays; anal fin with III spines and 13 to 15 (mode 14) soft rays, anal-fin base longer than second dorsal-fin base; pectoral fin with 13 or 14 (mode 14) unbranched rays, its length 31 to 49% (mean 35%) of standard length, posterior tip extending beyond level of posterior tip of pelvic fin (sometimes reaching to level of anal-fin origin); pectoral filaments 7, first filament shortest, just short of (or reaching to) level of anal-fin origin; third and fourth filaments usually longest, its length 56 to 118% (mean 92%) of standard length, extending well beyond level of midpoint of anal-fin base (sometimes extending beyond level of fork of caudal fin); caudal fin deeply forked, upper and lower caudal-fin lobes not filamentous, upper caudal-fin lobe 31 to 56% (mean 44%) of standard length. Pored lateral-line scales 49 to 51 (mode 50); lateral line simple, extending from upper end of gill opening to mid-distal margin of caudal-fin membrane; scale rows above lateral line 5 to 8 (mode 6), below 9 or 10 (mode 10). Gillrakers (total) 47 to 55 (mode 50). Vertebrae 10 precaudal and 14 caudal; supraneural bones 2. Swimbladder simple. **Colour:** Body and fins fawn to yellow; fins yellowish white; base of pectoral filaments white, becoming light brown on posterior tips; pectoral fin with scattered melanophores (intensity of pectoral-fin pigmentation variable).

**Geographical Distribution:** Known only from Padang (east side of Sumatra), Nias (west side of Sumatra), Java and Bali, Indonesia, and Phuket, Thailand (Fig. 52). The record from Andaman Sea is based only on a single specimen (PMBC 5913, 111 mm standard length).

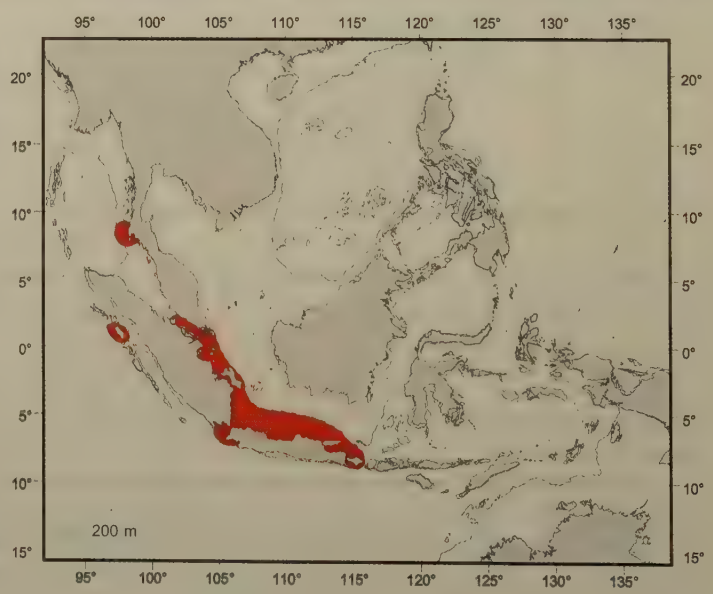



**Fig. 52** ***Filimanus perplexa***
Known distribution

**Habitat and Biology:** See above under genus account. No other data are available.

**Size:** Maximum standard length at least 16 cm (Feltes, 1991).

**Interest to Fisheries:** None.

**Local Names:** INDONESIA: Char-wen-e-kerning.

**Literature:** Feltes (1991); Motomura, Satapoomin and Iwatsuki. (2000); Feltes *in* Carpenter and Niem (2001).

**Remarks:** ***F. perplexa*** was described as a new species by Feltes (1991). Bleeker (1849, 1855, 1856, 1857a, 1859, 1860) erroneously referred to this species as ***Polynemus melanochir***, that name being used for ***F. perplexa*** by many subsequent authors (e.g. Volz, 1903; Bean and Weed, 1912; Myers, 1936). Although Feltes (1991) described ***F. perplexa*** on the basis of 26 specimens, he listed only 24 type specimens in his paper. The present whereabouts of remaining 2 type specimens are unknown. Comparisons of ***F. perplexa*** with a related species, ***F. hexanema***, are given in the account of the latter.

## *Filimanus sealei* (Jordan and Richardson, 1910)

**Fig. 53; Plate Ig**

***Polydactylus opercularis*** Seale and Bean, 1907: 234 [type locality: Zamboanga, Mindanao, Philippines; holotype (USNM 57844, 124 mm standard length); junior secondary homonym of ***Trichidion opercularis*** Gill, 1863]. ***Polydactylus sealei*** Jordan and Richardson, 1910: 16 (replacement name for ***P. opercularis*** Seale and Bean).

**Synonyms:** None.

**FAO Names: En** - Eightfinger threadfin; **Fr** - Barbure à huit doigts; **Sp** - Barbudo de ocho dedos.

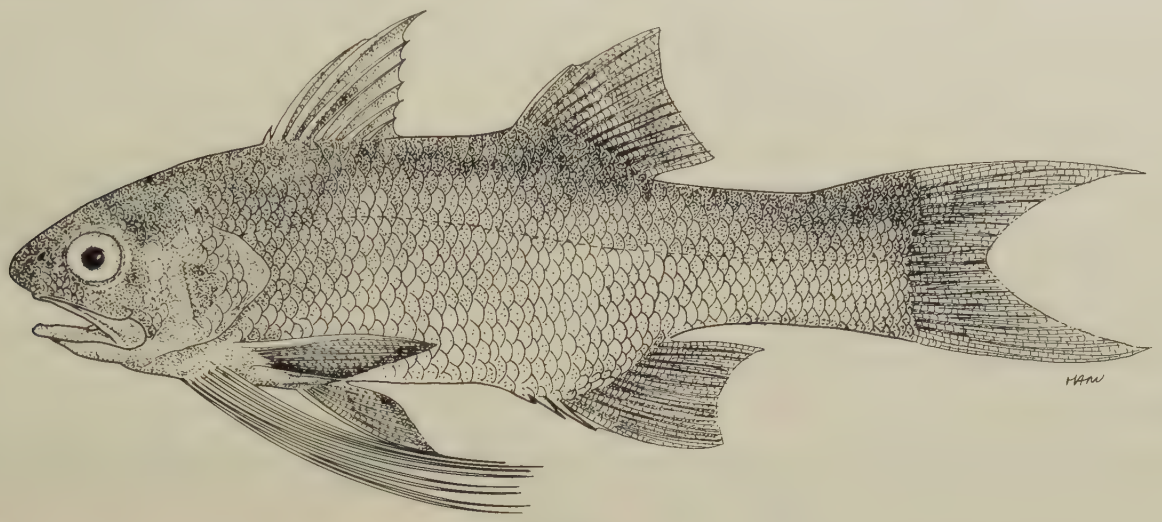


**Fig. 53** ***Filimanus sealei***

**Diagnostic Features:** A small species. Body depth at first dorsal-fin origin 29 to 35% (mean 32%) of standard length; head length 29 to 34% (mean 32%) of standard length. Snout pointed; occipital profile nearly straight. Posterior margin of maxilla extending beyond level of posterior margin of adipose eyelid; depth of posterior margin of maxilla less than eye diameter; upper-jaw length 14 to 16% (mean 16%) of standard length; lip on lower jaw well developed, dentary teeth restricted to dorsal surface; teeth villiform in narrow bands on palatines and ectopterygoids; vomer with an inconspicuous tooth plate. Posterior margin of preopercle serrated. First dorsal fin with VIII spines, all spine bases of similar thickness; second dorsal fin with I spine and 11 or 12 (mode 12) soft rays; anal fin with III spines and 11 soft rays, anal-fin base approximately equal to or greater than second dorsal-fin base; pectoral fin with 14 or 15 (mode 14) unbranched rays, its length 24 to 28% (mean 25%) of standard length, posterior tip just short of level of posterior tip of pelvic fin; pectoral filaments 8 (rarely 7), first filament shortest; third and fourth filaments usually longest, its length 37 to 55% (mean 42%) of standard length, reaching to (or just short of) level of anal-fin origin; caudal fin deeply forked, upper and lower caudal-fin lobes not filamentous, upper caudal-fin lobe 33 to 42% (mean 38%) of standard length. Pored lateral-line scales 46 to 50 (mode 49); lateral line simple, extending from upper end of gill opening to mid-distal margin of caudal-fin membrane; scale rows above lateral line 6 or 7 (mode 7), below 9 or 10 (mode 10). Gillrakers (total) 40 to 48 (mode 46). Vertebrae 10 precaudal and 14 caudal; supraneural bones 3. **Colour:** Upper sides of head and trunk with blue tinge, becoming silvery white on lower sides; fins yellow with black at margins.

**Geographical Distribution:** In the western Pacific, where it ranges from the Philippines to the Solomon Islands, including Papua New Guinea and the Bismarck Archipelago (Fig. 54). A single specimen (ANSP 123498, 108 mm standard length) supposedly collected from Western Australia in 1950, lacked detailed locality and other collection data. Accordingly, Australian distribution of the species still requires confirmation.

**Habitat and Biology:** See above under genus account. No other data are available.

**Size:** Maximum standard length at least 15 cm (Feltes, 1991).

**Interest to Fisheries:** None.

**Local Names:** PAPUA NEW GUINEA: Eight-fingered threadfin.

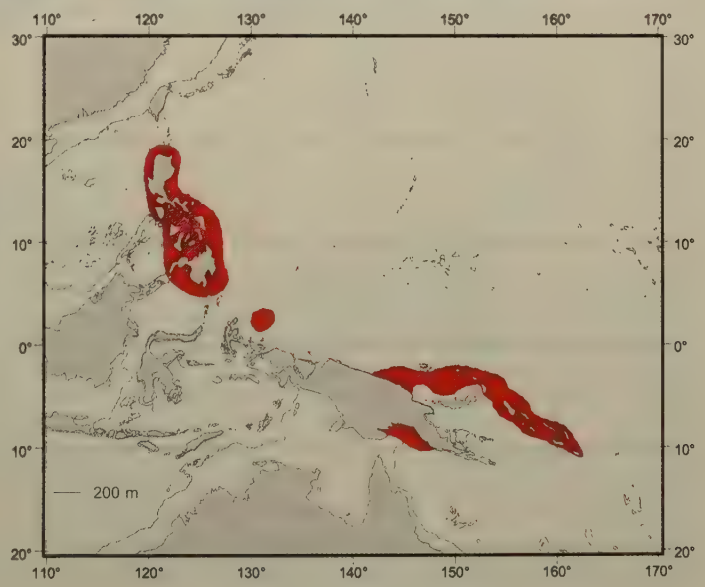



**Fig. 54** ***Filimanus sealei***
Known distribution

**Literature:** Feltes (1991); Feltes *in* Carpenter and Niem (2001).

**Remarks:** ***Polydactylus opercularis*** (Gill, 1863) was originally described as ***Trichidion opercularis*** on the basis of a single specimen (apparently lost) from the west coast of central America. Although the former was regarded as a valid species, Seale and Bean (1907) overlooked Gill's (1863) description and described ***Polydactylus opercularis*** on the basis of a single specimen (USNM 57844, 124 mm standard length) from Zamboanga, Mindanao, Philippines. Jordan and Richardson (1910) recognized this designation as a homonym and provided the replacement name of ***P. sealei***.

***Filimanus sealei*** can be easily distinguished from other congeners by the number of pectoral filaments (usually 8 versus usually 6 in ***F. hexanema*** and ***F. xanthonema***, and 7 in ***F. heptadactyla***, ***F. perplexa*** and ***F. similis***).

## *Filimanus similis* Feltes, 1991 — Fig. 55; Plate Ih

***Filimanus similis*** Feltes, 1991: 318, fig. 12 [type locality: Beruwala, Sri Lanka; holotype (USNM 304495, 99 mm standard length); 43 paratypes (AMS I. 211033-004, 3 specimens, 124 to 127 mm standard length; ANSP 74846, 2 specimens, 69 to 73 mm standard length; BMNH 1860.3.19.56, 105 mm standard length; BPBM 19048, 2 specimens, 101 mm standard length; CAS SU 14591, 116 mm standard length; CAS SU 22901, 99 mm standard length; FMNH 58982, 113 mm standard length; LACM 38134-17, 19 specimens, 82 to 104 mm standard length; USNM 149704, 3 specimens, 70 to 98 mm standard length; USNM 278215, 82 mm standard length; USNM 278202, 2 specimens, 61 to 69 mm standard length; USNM 278242, 7 specimens, 87 to 103 mm standard length)].

**Synonyms:** None.

**FAO Names: En** - Indian sevenfinger threadfin; **Fr** - Barbure sept doigts des Indes; **Sp** - Barbudo de siete dedos índico.

**Fig. 55** ***Filimanus similis***

**Diagnostic Features:** A small species. Body depth at first dorsal-fin origin 30 to 34% (mean 32%) of standard length; head length 29 to 34% (mean 31%) of standard length. Snout pointed; occipital profile nearly straight. Posterior margin of maxilla extending slightly beyond level of posterior margin of adipose eyelid; upper-jaw length 13 to 17% (mean 15%) of standard length; depth of posterior margin of maxilla less than eye diameter; lip on lower jaw well developed, dentary teeth restricted to dorsal surface; teeth villiform in narrow bands on palatines and ectopterygoids; vomer with an inconspicuous tooth plate. Posterior margin of preopercle serrated. First dorsal fin with VIII spines, all spine bases of similar thickness; second dorsal fin with I spine and 11 to 13 (mode 12) soft rays; anal fin with III spines and 10 to 12 (mode 11) soft rays, anal-fin base approximately equal to or greater than second dorsal-fin base; pectoral fin with 14 to 16 (mode 15) unbranched rays, its length 24 to 31% (mean 27%) of standard length, posterior tip just short of level of posterior tip of pelvic fin; pectoral filaments 7, first filament shortest, not reaching to level of posterior tip of pelvic fin; third and fourth filaments usually longest, its length 25 to 48% (mean 39%) of standard length, reaching to (sometimes extending slightly beyond) level of anal-fin origin; caudal fin deeply forked, upper and lower caudal-fin lobes not filamentous, upper caudal-fin lobe 31 to 44% (mean 38%) of standard

length. Pored lateral-line scales 45 to 49 (mode 48); lateral line simple, extending from upper end of gill opening to mid-distal margin of caudal-fin membrane; scale rows above lateral line 5 to 7 (mode 6), below 9 to 11 (mode 10). Gillrakers (total) 40 to 49 (mode 43). Vertebrae 10 precaudal and 14 caudal; supraneural bones 3. **Colour:** Upper sides of head and trunk with brown tinge, becoming golden on lower sides; posterior margins of first, second dorsal, anal, and caudal fins blackish, remaining parts yellowish; pectoral fin mostly black; base of pectoral filaments white, becoming yellowish white on posterior tips; base of pelvic fin white, other parts yellowish.

**Geographical Distribution:** In the eastern Indian Ocean where it ranges from Pakistan to the Andaman Sea (Fig. 56). The species has currently been recorded from Pakistan, India, Sri Lanka and Thailand (Phuket, west coast of Malay Peninsula).

**Habitat and Biology:** See above under genus account. No other data are available.

**Size:** Maximum standard length at least 13 cm.

**Interest to Fisheries:** A local bottom trawl fishery exists in southern parts of India.

**Local Names:** MYANMAR: Za yaw.

**Literature:** Feltes (1991).

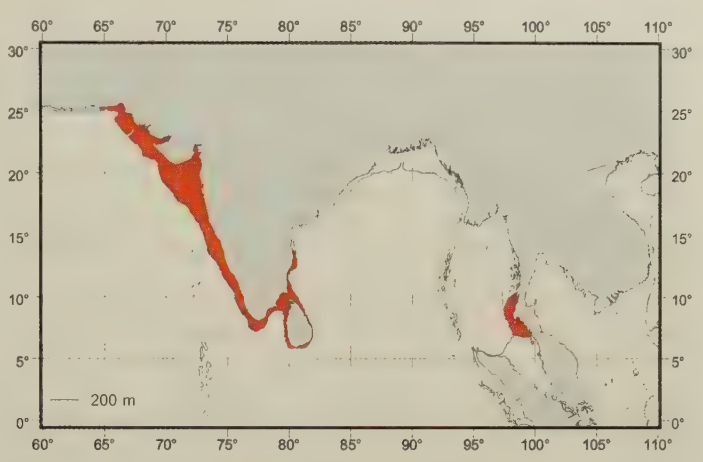



**Fig. 56** ***Filimanus similis***
Known distribution

**Remarks:** ***F. heptadactyla*** had been considered to be widely distributed in the Indo-Pacific. However, Feltes (1991) recognized that the species was restricted to the Pacific Ocean, including Indonesia, and described ***F. similis*** as a new species for Indian Ocean examples previously identified as ***F. heptadactyla***. Comparisons of ***F. similis*** with ***F. heptadactyla*** are given in the account of the latter.

## ***Filimanus xanthonema*** (Valenciennes, 1831)

**Fig. 57; Plate IIa**

***Polynemus xanthonemus*** Valenciennes *in* Cuvier and Valenciennes, 1831: 517 [type locality: Pondicherry, India; lectotype (MNHN A. 3033, 1 of 2 specimens, 109 mm standard length) designated by Feltes, 1991; paralectotype (MNHN A. 3033, 1 of 2 specimens, 107 mm standard length)].

**Synonyms:** ***Polynemus diagrammicus*** Bleeker, 1849: 60 (type locality: Jakarta, Java, Indonesia; type material probably lost, see Feltes, 1991). ***Polynemus pfeifferi*** Bleeker, 1853a: 249 [type locality: Priaman, Sumatra, Indonesia; holotype probably included in RMNH 6008 (5 specimens, 39 to 105 mm standard length), see Feltes, 1991]. ***Polydactylus konadaensis*** Mishra and Krishnan, 1993: 285 [type locality: Konada, Andhra Pradesh, India; holotype (ZSI/MBS-F-631, 105 mm standard length); paratype (ZSI/MBS-F-632, 97 mm standard length)].

**FAO Names: En** - Yellowthread threadfin; **Fr** - Barbure à doigts oranges; **Sp** - Barbudo de dedos amarillos.

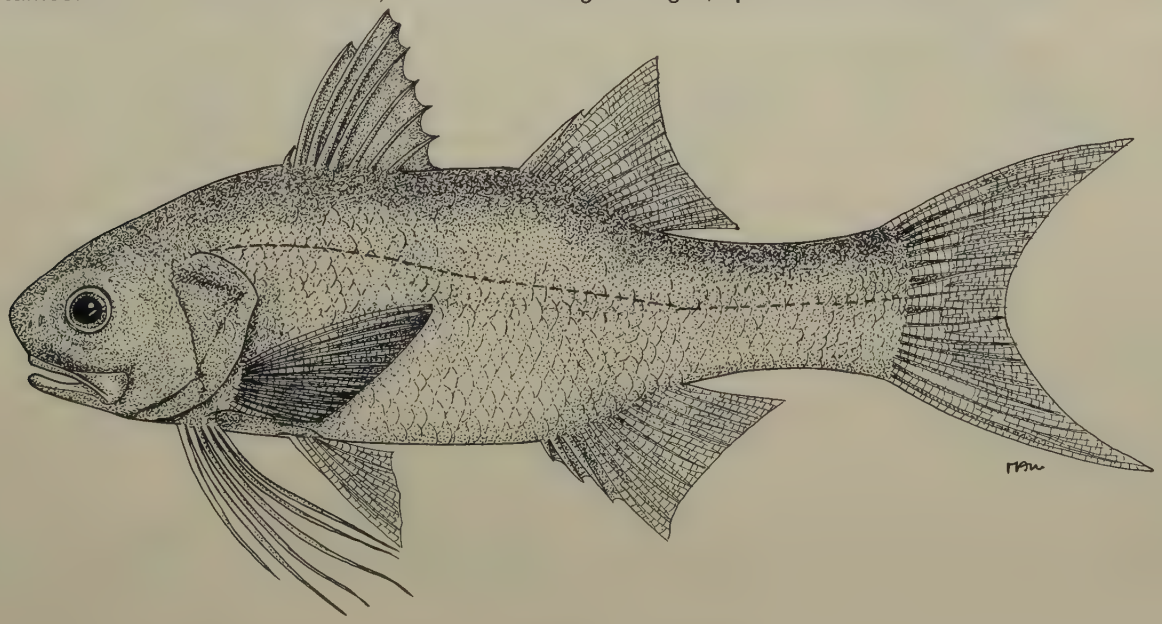


**Fig. 57** ***Filimanus xanthonema***

**Diagnostic Features:** A small species. Body depth at first dorsal-fin origin 27 to 35% (mean 31%) of standard length; head length 28 to 35% (mean 31%) of standard length. Snout pointed; occipital profile nearly straight. Posterior margin of maxilla extending slightly beyond level of posterior margin of adipose eyelid; upper-jaw length 14 to 17% (mean 15%) of standard length; depth of posterior margin of maxilla less than eye diameter; lip on lower jaw well developed, dentary teeth restricted to dorsal surface; teeth villiform in narrow bands on palatines and ectopterygoids; vomer with an inconspicuous tooth plate. Posterior margin of preopercle serrated. First dorsal fin with VIII spines, all spine bases of similar thickness; second dorsal fin with I spine and 11 to 13 (mode 12) soft rays; anal fin with III spines and 10 to 12 (mode 11) soft rays, anal-fin base approximately equal to or greater than second dorsal-fin base; pectoral fin with 13 to 15 (mode 15) unbranched rays, its length 23 to 28% (mean 26%) of standard length, posterior tip just short of level of posterior tip of pelvic fin; pectoral filaments usually 6 on each side but occasionally 5 on each side, or asymmetrically 5 and 6 or 6 and 7, first filament shortest, not reaching to level of posterior tip of pelvic fin; third and fourth filaments usually longest, its length 27 to 47% (mean 38%) of standard length, reaching to (sometimes extending slightly beyond) level of anal-fin origin; caudal fin deeply forked, upper and lower caudal-fin lobes not filamentous, upper caudal-fin lobe 26 to 44% (mean 36%) of standard length. Pored lateral-line scales 43 to 52 (mode 47); lateral line simple, extending from upper end of gill opening to mid-distal margin of caudal-fin membrane; scale rows above lateral line 5 to 8 (mode 6), below 9 to 12 (mode 10). Gillrakers (total) 36 to 46 (mode 43). Vertebrae 10 precaudal and 14 caudal; supraneural bones 3. **Colour:** Upper sides of head and trunk with brown tinge, becoming golden on lower sides; posterior margins of first, second dorsal, anal, and caudal fins blackish, remaining parts yellowish; pectoral fin mostly black; base of pectoral filaments white, becoming yellowish white on posterior tips; base of pelvic fin white, other parts yellowish.

**Geographical Distribution:** ***F. xanthonema*** is distributed in the eastern Indian and western Pacific Oceans where it ranges from east coast of India to Lombok Island, Indonesia (Fig. 58).

**Habitat and Biology:** Available collection data for ***F. xanthonema*** indicate that the species occurs on muddy bottoms from depths of 1 to 30 m. According to Hida (1967), ***F. xanthonema*** exhibits protandry, sex changing from male to female within a narrow size range. Males range from 9.0 to 11.0 cm standard length with a peak at 10.0 cm, females ranging from 10.0 to 11.5 cm with a peak at 10.5 to 11.0 cm. Hermaphrodites range from 9.0 to 11.5 cm with a peak at 10.0 cm. ***Filimanus xanthonema*** feeds on small crustaceans, especially Mysidacea and shrimps in the Bay of Bengal (Hida, 1967).

**Size:** Maximum standard length at least 14 cm (Feltes, 1991).

**Interest to Fisheries:** None.

**Local Names:** MYANMAR: Za yaw.

**Literature:** Feltes (1991); Motomura *et al.* (2001b); Feltes *in* Carpenter and Niem (2001).

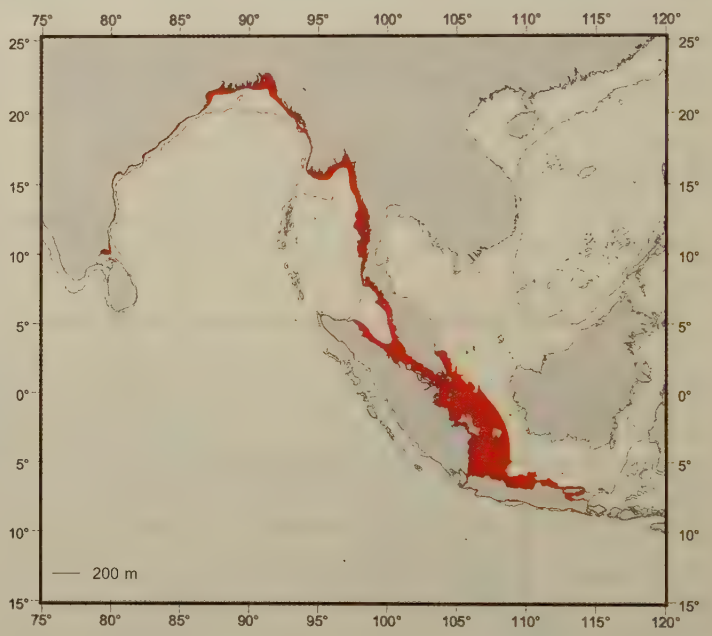



**Fig. 58** ***Filimanus xanthonema***
Known distribution

**Remarks:** ***F. xanthonema*** was originally described as ***Polynemus xanthonemus*** on the basis of 2 specimens registered as MNHN A. 3033. The larger (109 mm standard length, with 6 pectoral filaments on each side) of the 2 specimens was designated as lectotype by Feltes (1991), the paralectotype (107 mm standard length) having asymmetrically 6 and 7 pectoral filaments. ***Polynemus diagrammicus***, from Jakarta, Java, Indonesia, and ***P. pfeifferi***, from Priaman, Sumatra, Indonesia, were regarded as junior synonyms of ***F. xanthonema*** by Feltes (1991). Recently, ***Polydactylus konadaensis***, from Konada, Andhra Pradesh, India, was also reduced to the synonymy of ***F. xanthonema*** (see Motomura *et al.*, 2001b).

***Filimanus xanthonema*** can be easily distinguished from other congeners by the number and length of pectoral filaments. The species usually has 6 pectoral filaments on each side (occasionally 5 on each side, or asymmetrically 5 and 6 or 6 and 7), not reaching to level with the midpoint of the anal-fin base, whereas ***F. hexanema*** and ***F. perplexa*** have 6 and 7 pectoral filaments, respectively, extending beyond the level of the midpoint of the anal-fin base in both species. ***Filimanus heptadactyla***, ***F. sealei*** and ***F. similis*** have 7, 8 (occasionally 7) and 7 pectoral filaments, respectively, not reaching to level with the midpoint of the anal-fin base.

## *Galeoides* Günther, 1860

*Galeoides* Günther, 1860: 319, 332 [type species: ***Polynemus polydactylus*** Vahl, 1798, presently regarded as a junior synonym of ***Galeoides decadactylus*** (Bloch, 1795)].

**Synonyms:** None.

**Species:** The genus comprises a single species:

***Galeoides decadactylus***: West coast of Africa, Algeria to Namibia.

**Remarks:** To date, ***Galeoides*** has been considered to comprise 2 species, ***G. decadactylus*** (type species of the genus) and ***G. microps*** (e.g. Fowler, 1935; Myers, 1936; Springer, 1982), the latter being a poorly known threadfin originally described by Steindachner (1869a) on the basis of a single specimen (NMW 77568, 171 mm standard length) from China (probably erroneous). However, examination of the holotype of ***G. microps*** showed it to belong to the genus ***Polynemus***, being a junior synonym of ***P. melanochir melanochir*** (see account of ***P. m. melanochir***). Accordingly, ***Galeoides*** represents a monotypic genus (Motomura, Mikschi and Iwatsuki, 2001).

***Galeoides*** has the following unique characters among the family: lateral line simple, extending from upper end of gill opening to lower end of upper caudal-fin lobe; a black spot present below anterior part of lateral line; and swimbladder extending beyond anal-fin origin.

## *Galeoides decadactylus* (Bloch, 1795) **Fig. 59; Plate IIb**

***Polynemus decadactylus*** Bloch, 1795: 26, pl. 401 [type locality: Guinea; holotype (ZMB 569, 175 mm standard length)].

**Synonyms:** ***Polynemus polydactylus*** Vahl, 1798: 164 (type locality: near Tangier, Morocco; no types known). ***Polynemus enneadactylus*** Cuvier *in* Cuvier and Valenciennes, 1829: 392 (type locality: Tangier, Morocco; no types known). ***Polynemus astrolabi*** Sauvage, 1881: 102 [type locality: Mauritius (clearly erroneous, see Motomura, Iwatsuki and Kimura, 2001b); holotype (MNHN 9727, 190 mm standard length)].

**FAO Names: En** - Lesser African threadfin; **Fr** - Petit capitaine; **Sp** - Barbudo enano africano.

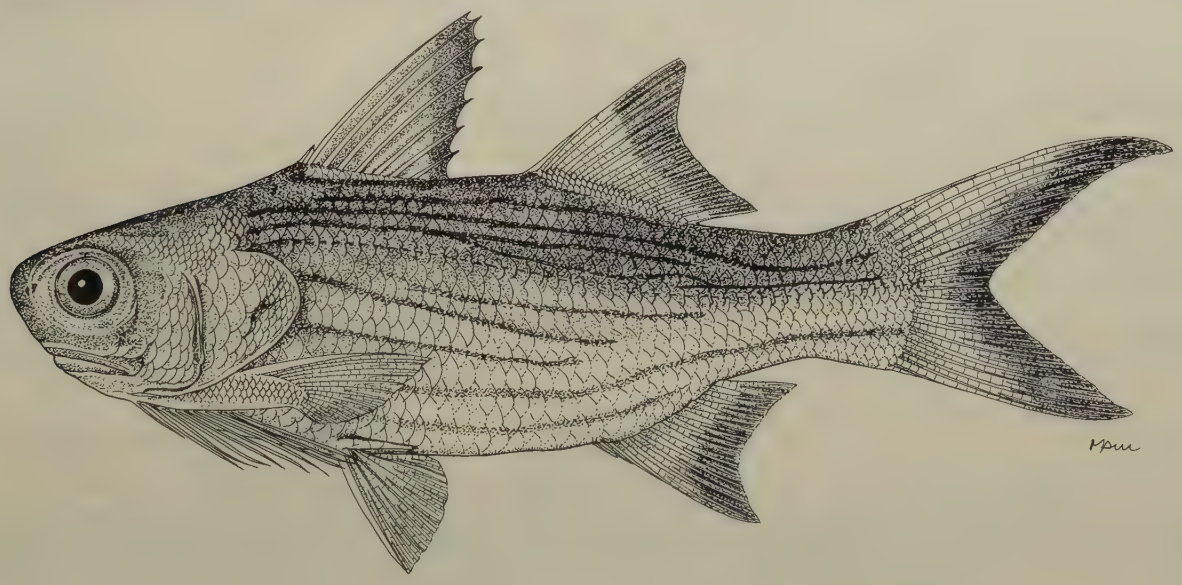


**Fig. 59** ***Galeoides decadactylus***

**Diagnostic Features:** A medium-sized species. Body moderately deep, body depth at first dorsal-fin origin 29 to 35% (mean 32%) of standard length; head length 31 to 36% (mean 33%) of standard length. Adipose eyelid well developed; eye diameter greater than snout length. Lip on lower jaw well developed, dentary teeth restricted to dorsal surface; width of tooth band on upper and lower jaws greater than space (on symphysis) separating tooth bands on opposing premaxillae; teeth villiform in broad bands on jaws, palatine and ectopterygoids, tooth plates on palatines longer than those on ectopterygoids; tooth plates on ectopterygoids conspicuously small; vomerine tooth plate covered with skin and teeth absent. Posterior margin of maxilla reaching to (or just short of) level of posterior margin of adipose eyelid; upper-jaw length 12 to 14% (mean

13%) of standard length; maxillary scales absent. Posterior margin of preopercle serrated. Basisphenoid in contact with prootic; sphenotics not visible dorsally between anterior margins of parietal and pterotic. First dorsal fin with VIII spines; second dorsal fin with I spine and 13 or 14 (mode 13) soft rays; anal fin with III spines and 10 or 11 (mode 11) soft rays, anal-fin base less than second dorsal-fin base; pectoral fin with 12 to 15 (mode 15) unbranched rays, its length 21 to 25% (mean 23%) of standard length, posterior tip just short of level of posterior tip of pelvic fin; pectoral-fin insertion well below midline of body; pectoral-fin base (including base of pectoral filaments) greater than or equal to upper-jaw length; pectoral filaments 9 to 11 (mode 9); first filament shortest, not reaching to level of pelvic-fin origin; uppermost filament longest, its length 21 to 33% (mean 27%) of standard length, reaching to or extending beyond level of pelvic-fin origin; caudal fin deeply forked, upper and lower caudal-fin lobes not filamentous, upper caudal-fin lobe 31 to 43% (mean 38%) and lower caudal-fin lobe 33 to 36% (mean 34%) of standard length. Pored lateral-line scales 45 to 50 (mode 46); lateral line simple, extending from upper end of gill opening to lower end of upper caudal-fin lobe; scale rows above lateral line 5 or 6 (mode 5), below 7 to 9 (mode 8). Gillrakers 9 to 14 on upper limb, 15 to 23 on lower limb, 24 to 36 total; gillrakers decreasing with fish growth. Vertebrae 10 precaudal and 14 caudal; supraneural bone 1. Swimbladder simple, extending beyond anal-fin origin. **Colour:** Upper sides of head and trunk with brown tinge, becoming silver on lower sides; posterior margins of first and second dorsal fins, and caudal fins dense black, remaining parts blackish; pelvic and anal fin white; pectoral fin mostly black; base of pectoral filaments white, becoming blackish on posterior tips; a black spot, its diameter approximately equal to eye diameter, present below anterior part of lateral line; several brown stripes along longitudinal scale rows above and below lateral line (disappeared in preserved specimens).

**Geographical Distribution:** Generally distributed from Morocco to Angola, west coast of Africa. In addition, the species has been reported from Algeria, northern Africa and Namibia, southern Africa (Fig. 60).

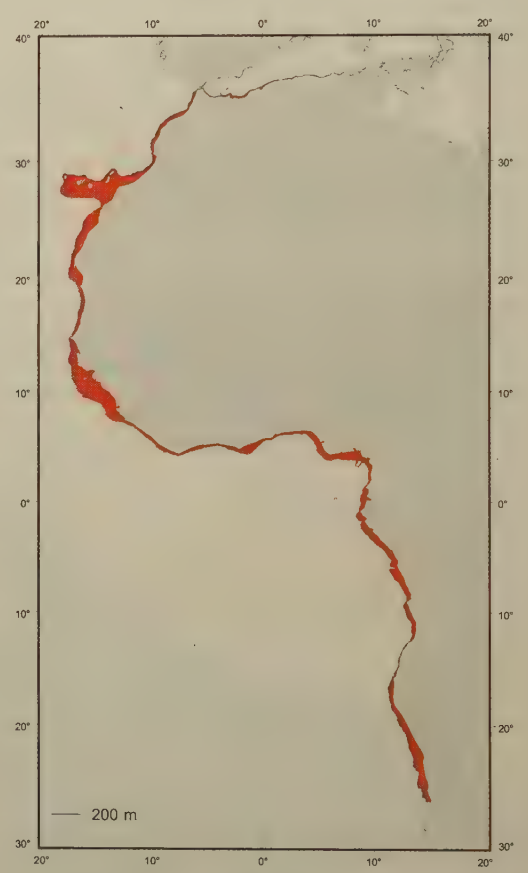



**Fig. 60** ***Galeoides decadactylus***
Known distribution

**Habitat and Biology:** Usually taken on muddy bottoms in shallow coastal waters from depths of 10 to 70 m, and frequently found in estuaries and lagoons. Generally feeds on crustaceans and small fishes (Longhurst, 1957: tables 1, 9). Longhurst (1960) examined the stomach contents of 630 specimens collected from the open sea and 1 437 specimens from estuaries, and found that detritus amounted to 31% of food contained in the stomachs of the estuarine specimens (versus 0% in open sea specimens).

Longhurst (1965) studied the biology, including sexuality and growth, of ***G. decadactylus*** in Lagos, Nigeria, finding that about 25% of females developed directly from the juvenile stages, the others developing female gonads after passing through a non-functional hermaphroditic stage arising in apparently normal males. He noted the sex composition of 25 357 adult specimens as: males 63.73%, hermaphrodites 22.22% and females 14.03%. Spawning of the species occurs in all months, peaking in the dry season, but almost ceasing during the rainy season in Nigerian waters. Derivation of lengths at first maturity for the species is complicated by the nature of the reproductive cycle. Lengths ranged from 150 mm total length for males to 255 mm for secondary females, the species growing rapidly during the first year. At 1 year old, the species averages 207 mm total length, 317 mm at 2 years old, and 390 mm at 3 years old. According to Longhurst (1965), it appears improbable that many individuals survive a fourth year of life.

Aboussouan (1966) described and illustrated larval developmental stages of ***G. decadactylus*** (as ***G. polydactylus***) from Senegal.

**Size:** Maximum total length 45 cm, common to 30 cm (Allen *in* Fischer *et al.*, 1981).

**Interest to Fisheries:** In Nigeria, ***G. decadactylus*** is an important component in the commercial trawl fishery, constituting between 10 and 20% of the total landings by weight, the percentage differing from port to port (Longhurst, 1963).

**Local Names:** GUINEA: Barbinho, Sanis; MAURITANIA: Plexiglass, Sibet mba, Tiekem; SÃO TOMÉ AND PRINCIPE: Barbudo; SENEGAL: Barbo, Barudo de dez barbas, Cekéém, Lesser African threadfin, Sikket mbàw; SIERRA LEONE: Shineose.

**Literature:** Allen *in* Fischer *et al.* (1981); Daget and Njock *in* Daget *et al.* (1986); Njock *in* Quéro *et al.* (1990); Motomura, Iwatsuki and Kimura (2001b).

**Remarks:** ***Polynemus enneadactylus*** and ***P. polydactylus*** have been treated as junior synonyms of ***G. decadactylus*** (e.g. Daget and Njock *in* Daget *et al.*, 1986; Njock *in* Quéro *et al.*, 1990). In the faunal work, Fricke (1999) synonymized ***Polynemus astrolabi*** with ***Polydactylus sextarius***. However, the holotype (MNHN 9727, 190 mm standard length) of ***Polynemus astrolabi*** differs from the specimens including the holotype (ZMB 565, 125 mm standard length) of ***Polydactylus***

***sextarius*** in having 9 pectoral filaments (6 in the latter), unbranched pectoral-fin rays (almost branched in the latter) and 1 supraneural bone (3 in latter), and in lateral-line squamation on the caudal-fin membrane. Recently, ***Polynemus astrolabi*** was regarded as a junior synonym of ***G. decadactylus*** by Motomura, Iwatsuki and Kimura (2001b).

Although Sauvage (1881, 1891) reported ***Polynemus astrolabi*** (= ***G. decadactylus***) from Mauritius, Indian Ocean, the species is distributed along the west coast of Africa. Because the Equatorial current, which is the primary current influencing waters off Mauritius, flows from the equator to the Southwest Indian Ridge, it appears to be highly unlikely that the species can be transported from the west coast of Africa to Mauritius. Therefore, the type locality (Mauritius) of ***Polynemus astrolabi*** is considered to be erroneous.

## ***Leptomelanosoma*** Motomura and Iwatsuki, 2001

***Leptomelanosoma*** Motomura and Iwatsuki, 2001a: 13 (type species: ***Polynemus indicus*** Shaw, 1804).

**Synonyms:** None.

**Species:** The genus comprises a single species:

***Leptomelanosoma indicum***: Indo-West Pacific, Pakistan to Indonesia.

**Remarks:** ***Leptomelanosoma*** has been recently proposed for the polynemid fish, ***Polynemus indicus***, previously identified as a member of ***Polydactylus***. ***Leptomelanosoma*** differs from other genera in having the following characters: swimbladder with many appendages inserted into lateral walls of abdominal cavity (unique character among the family); anterior one-third of lower jaw with small teeth extending onto lateral surface, adjacent portion of lip poorly developed throughout life [this character also present in large specimens of ***Parapolynemus*** and ***Polydactylus opercularis***]; ethmoid not covered dorsally by frontals; sphenotics visible dorsally between anterior margins of parietal and pterotic (unique character among the family); upper and lower caudal-fin lobes very long, filamentous (this character also present in ***Parapolynemus***); greyish black body (this character also appears in ***Polydactylus longipes***).

## ***Leptomelanosoma indicum*** (Shaw, 1804) **Fig. 61; Plate IIc**

***Polynemus indicus*** Shaw, 1804: 155 [type locality: Vizagapatnam, India, based on "Maga Booshee"of Russell (1803: 68, fig. 184); no types known, see Motomura and Iwatsuki, 2001a].

**Synonyms:** ***Polynemus sele*** Hamilton, 1822: 226 (type locality: estuaries of Ganges, India; no types known, see Motomura and Iwatsuki, 2001a). ***Polynemus uronemus*** Cuvier 1829a: 155 (type locality: unknown; new name for ***P. indicus*** Shaw, 1804; no types known, see Motomura and Iwatsuki, 2001a). ***Polynemus gelatinosus*** McClelland, 1843: 181, pl. 6 (type locality: Bengal, India; new name for ***P. sele*** Hamilton, 1822; no types known, see Motomura and Iwatsuki, 2001a).

**FAO Names: En** - Indian threadfin; **Fr** - Barbure indien; **Sp** - Barbudo indio.

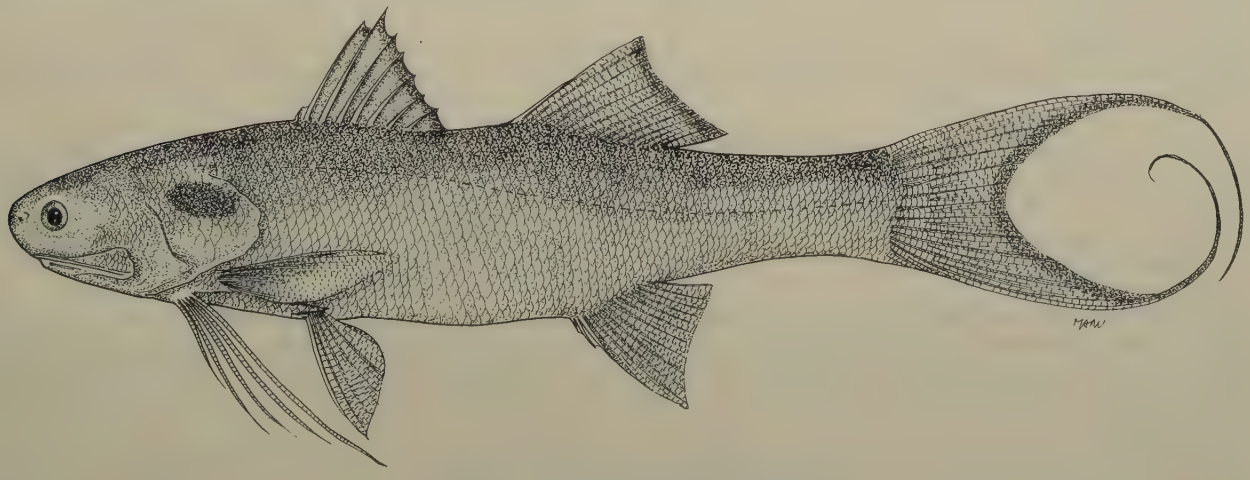


**Fig. 61** ***Leptomelanosoma indicum***

**Diagnostic Features:** A large species. Body and head elongate, body depth at first dorsal-fin origin 22 to 25% (mean 23%) of standard length; head length 30 to 34% (mean 32%) of standard length. Adipose eyelid moderately developed; eye diameter approximately equal to or greater than snout length. Anterior one-third of lower jaw with small teeth extending onto lateral surface, adjacent portion of lip poorly developed; width of tooth band on upper and lower jaws greater than space (on symphysis) separating tooth bands on opposing premaxillae; teeth villiform in broad bands on jaws, vomer, palatines and ectopterygoids, tooth plates on palatines longer than those on ectopterygoids; tooth plates on palatines well developed. Posterior margin of maxilla extending well beyond level of posterior margin of adipose eyelid; upper-jaw length 14 to 15% (mean 15%) of standard length; maxilla covered with deciduous scales. Posterior margin of preopercle serrated. Basisphenoid in contact with prootic; sphenotics visible dorsally between anterior margins of parietal and pterotic. First dorsal fin with VIII spines; second dorsal fin with I spine and 12 or 13 (mode 13) soft rays; anal fin with III spines and 10 or 11 (mode 11) soft rays, anal-fin base less than second dorsal-fin base; pectoral fin with 12 to 14 (mode 14) rays, its length 19 to 22% (mean 21%) of standard length, posterior tip not reaching to level of posterior tip of pelvic fin; pectoral-fin insertion well below midline of body; pectoral-fin base (including base of pectoral filaments) less than upper-jaw length; pectoral filaments 5; first filament shortest, not reaching to level of pelvic-fin origin; fifth filament longest, its length 28 to 45% (mean 37%) of standard length, extending well beyond level of posterior tip of pelvic fin; caudal fin deeply forked, upper and lower caudal-fin lobes very long, filamentous, upper caudal-fin lobe 39 to 71% (mean 58%) and lower caudal-fin lobe 36 to 78% (mean 60%) of standard length. Pored lateral-line scales 69 to 72 (mode 70); lateral line simple, extending from upper end of gill opening to upper end of lower caudal-fin lobe; scale rows above lateral line 7 or 8 (mode 8), below 9 to 12 (mode 10). Gillrakers 8 or 9 (mode 8) on upper limb, 10 to 12 (mode 11) on lower limb, 18 to 21 (mode 19) total. Vertebrae 10 precaudal and 14 caudal; supraneural bones 2. Swimbladder with many appendages inserted into lateral walls of abdominal cavity. **Colour:** Head and upper sides of trunk tinged slightly blackish brown, becoming deep black on lower sides; snout and abdominal regions blackish; membranes of first and second dorsal fins and caudal fin blackish, distal part of these fins black; pectoral-fin membrane deep black; origin of pectoral filaments dusky yellowish, grading to blackish posteriorly; pelvic-fin origin dusky yellowish, other parts dusky white.

**Geographical Distribution:** Although ***Leptomelanosoma indicum*** has been considered to be widely distributed in the Indo-West Pacific, ranging from South Africa to Indonesia (e.g. Smith, 1949; Smith *in* Smith and Heemstra, 1986; Menon and Babu Rao *in* Fischer and Banchi, 1984; Feltes *in* Carpenter and Niem, 2001), reports of the species from the east coast of Africa must presently remain unsubstantiated, owing to the examination of a specimen (SAIAB 19493, 325 mm standard length) from South Africa, previously identified and reported as ***Polydactylus indicus*** (= ***L. indicum***), showing it to represent ***Polydactylus plebeius***. The species is currently confirmed from Pakistan to Papua New Guinea (Fig. 62). The record from Papua New Guinea (Kerema Bay, Gulf of Papua) is based only on a single specimen (CSIRO A. 3028, 120 mm standard length).

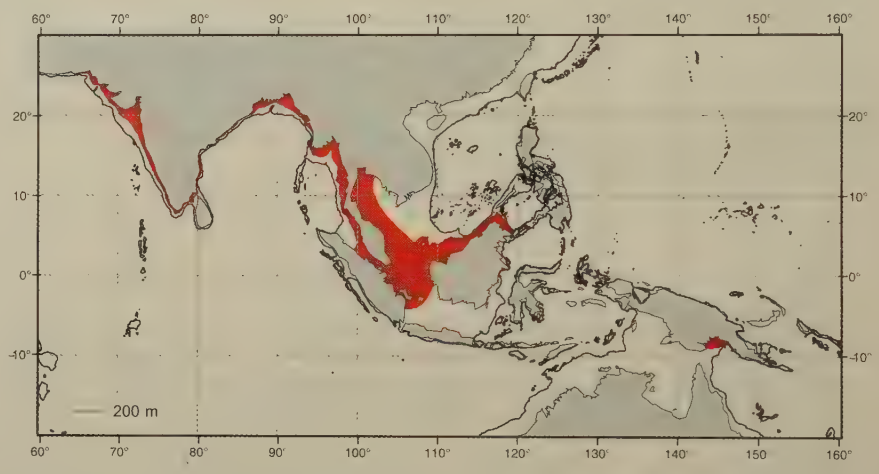



**Fig. 62** ***Leptomelanosoma indicum***
Known distribution

**Habitat and Biology:** Mainly occurs near estuaries, sometimes entering rivers, and is occasionally taken from depths to 100 m. Young of the species feed on small crustaceans, including shrimps and prawn larvae, but become piscivorous with increasing growth.

Kagwade (1969) noted the occurrence of hermaphroditism in ***L. indicum*** from India, reporting the sex composition of 83 specimens as: hermaphrodites 39.76%, males 19.28% and females 40.96%. According to Nayak (1959a), 1-year-olds attain 345 mm total length, 2-year-olds 545 mm total length and 3-year-olds 745 mm total length (based on trawl samples from Dwarka, India). Kagwade (1970) considered that specimens from 910 to 1000 mm total length (the dominant size group in the fishery) were 5-year-olds.

Nayak (1959a) found ***L. indicum*** to have 2 peak spawning periods, during April to June and October to December, around Mumbai, northwestern India, the first period being the major one. On the other hand, Kuthalingam (1960) recorded intensive spawning of the species around Chennai, southeastern India, during October to November. Karekar and Bal (1960) reported the size of ***L. indicum*** at first maturity to be about 800 mm standard length.

Nayak (1959a) and Karekar and Bal (1960) described the following ova sizes of ***L. indicum*** from India: immature ovaries with ova measuring up to 0.3 mm diameter, maturing ovaries with ova between 0.31 and 0.62 mm diameter, and mature ovaries with ova between 0.63 and 1.10 mm diameter. Oil globules in mature ova were 0.26 to 0.40 mm diameter. According to Kuthalingam (1960) and Kagwade (1970), planktonic eggs in this species averaged 1.3 mm diameter, with a large oil

globule of 0.5 mm diameter. Scale rudiments were apparent on larvae measuring 24.8 mm, post-larvae reaching the juvenile stage at 31.8 mm.

**Size:** Maximum total length at least 1.4 m (Kagwade, 1970).

**Interest to Fisheries:** One of the most important species in fisheries of India, Sri Lanka, Bangladesh, Myanmar, Thailand, Malaysia and Singapore, being caught by gill nets, trawls, handlines and beach seines. According to Nayak (1959a) and Kagwade (1970), during 1950 and 1951 and 1956 and 1957, catches of ***L. indicum*** in India accounted for between 0.89 and 26.0% of the total landings.

**Local Names:** BANGLADESH: Lakhua; INDIA: Indian threadfin; INDONESIA: Kurau hitam; MALAYSIA: Kurau, Kurow, Mancong, Senangin; MYANMAR: Ka ku yan; SRI LANKA: Tahlunkala.

**Literature:** Motomura and Iwatsuki (2001a).

**Remarks:** ***Polynemus indicus*** (= ***Leptomelanosoma indicum***) was proposed by Shaw (1804), for the "Maga Booshee" of Russell (1803), whose description of the species included a correct figure (fig. 184), but lacked a formal scientific name and gave no indication of any type specimens. Although the description of ***P. indicus*** by Shaw (1804) and that earlier by Russell (1803) were very poor, Russell's drawing clearly indicates 5 pectoral filaments, long caudal-fin lobes and a greyish black body. ***Leptomelanosoma indicum*** can be easily distinguished from other polynemid species by the combination of the characters. Subsequently, Hamilton (1822) described ***Polynemus sele*** as a new species from estuaries of the Ganges River, India. This description also gave no indication of any type specimens. However, the diagnostic characters of 5 pectoral filaments and long caudal-fin lobes given in the original description of ***P. sele*** are consistent with those of ***L. indicum***. An initial unpublished plate of ***P. sele***, subsequently published by McClelland (1843, pl. 6), also shows 5 pectoral filaments, long caudal-fin lobes and a greyish black body. Furthermore, Hamilton (1822) wrote; "The Maga booshee [= ***P. indicus***] of Russell has certainly a strong resemblance to the Sele [= ***P. sele***] of the Ganges." Although ***P. sele*** was said to differ from the "Maga Booshee" of Russell (1803) in having 7 first dorsal-fin spines (versus 8 spines in the latter) and 14 second dorsal-fin rays (15 rays), the first spine of the first dorsal fin was apparently overlooked by Hamilton (1822) due to its very small size.

Cuvier *in* Cuvier and Valenciennes (1829) described ***Polynemus uronemus***, as a new name for ***P. indicus***. Furthermore, McClelland (1843) described ***P. gelatinosus***, from Bengal, India, as a new name for ***P. sele***, and included Hamilton's (1822) unpublished plate. Both new names, ***P. uronemus*** and ***P. gelatinosus***, are junior synonyms.

## ***Parapolynemus*** Feltes, 1993

***Parapolynemus*** Feltes, 1993: 207 (type species: ***Polynemus verekeri*** Saville-Kent, 1889).

**Synonyms:** None.

**Species:** The genus comprises a single species:

***Parapolynemus verekeri***: Northern Australia and southern Papua New Guinea.

**Remarks:** ***Parapolynemus*** has been recently proposed for the polynemid fish, ***Polynemus verekeri***. According to Feltes (1993), ***Parapolynemus*** differs from other genera in having the following unique characters: highly porous skeleton; urohyal with several longitudinal ridges on lateral surface of lamella; 3 infraorbitals; haemal spine of eleventh vertebra with prominent medial anterior-posterior expansion.

## ***Parapolynemus verekeri*** (Saville-Kent, 1889) **Fig. 63; Plate IId**

***Polynemus verekeri*** Saville-Kent, 1889: 234 [type locality: Ord River, Cambridge Gulf, northern Australia; lectotype (AMS I. 2770, 72 mm standard length) designated by Feltes, 1993; paralectotype (AMS I. 2771, 54 mm standard length)].

**Synonyms:** ***Polynemus intermedius*** Nichols, 1954: 3 [type locality: Merauke River, Papua New Guinea; holotype (AMNH 20114, 79 mm standard length); 16 paratypes (AMNH 20115, 74 mm standard length; AMNH 20116, 15 specimens, 37 to 79 mm standard length)].

**FAO Names: En** - Dwarf paradise fish; **Fr** - Barbure paradis nain; **Sp** - Barbudo paraíso enano.

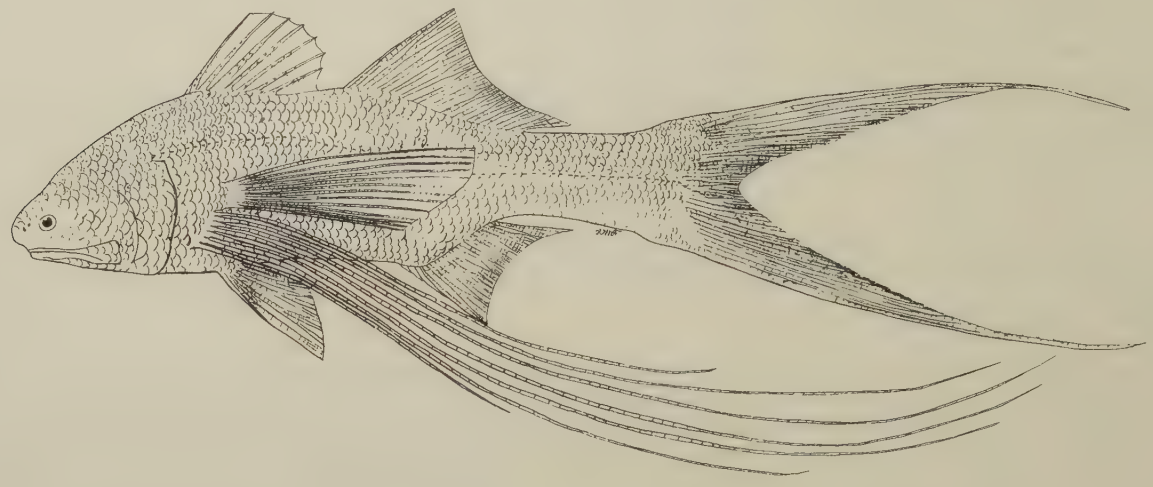


**Fig. 63** ***Parapolynemus verekeri***

**Diagnostic Features:** A small species. Body and head elongate, body depth at first dorsal-fin origin 20 to 32% (mean 25%) of standard length; head length 26 to 32% (mean 29%) of standard length. Interorbital concave in larger specimens. Adipose eyelid poorly developed; eye diameter less than snout length. Lip on lower jaw well developed, dentary teeth restricted to dorsal surface in smaller specimens, but in larger specimens (over about 70 mm standard length) anterior one-third of lower jaw with small teeth extending onto lateral surface, adjacent portion of lip poorly developed; width of tooth band on upper and lower jaws less than space (on symphysis) separating tooth bands on opposing premaxillae; teeth villiform in broad bands on jaws, palatines and ectopterygoids, tooth plates on palatines longer than those on ectopterygoids; vomerine teeth absent. Posterior margin of maxilla extending well beyond level of posterior margin of adipose eyelid; maxilla covered with deciduous scales. Posterior margin of preopercle not serrated, but with a single spine posteroventrally; upper-jaw length 16 to 19% (mean 18%) of standard length. Basisphenoid absent; sphenotics not visible dorsally between anterior margins of parietal and pterotic. First dorsal fin with VIII spines; second dorsal fin with I spine and 11 to 14 (mode 13) soft rays; anal fin with III spines and 10 to 12 (mode 11) soft rays, anal-fin base less than second dorsal-fin base; pectoral fin with 12 to 14 (mode 13) rays, its length 37 to 51% (mean 44%) of standard length, posterior tip extending beyond level of posterior part of anal-fin base; pectoral-fin insertion near midline of body; pectoral-fin base (including base of pectoral filaments) less than upper-jaw length; pectoral filaments 6 or 7 (mode 7); first filament shortest, extending beyond level of anal-fin origin; fifth filament longest, its length 47 to 104% (mean 79%) of standard length, extending well beyond level of posterior tip of caudal fin; caudal fin deeply forked, upper and lower caudal-fin lobes very long, filamentous, upper caudal-fin lobe 37 to 86% (mean 60%) of standard length. Pored lateral-line scales 50 to 60 (mode 56); lateral line simple, extending from upper end of gill opening to upper end of lower caudal-fin lobe; scale rows above lateral line 4 to 6 (mode 5), below 8 to 11 (mode 10). Gillrakers 30 to 43 (mode 40). Vertebrae 10 precaudal and 14 caudal; supraneural bones 2. Swimbladder not apparent. **Colour:** Head and body yellow; upper sides of trunk tinged slightly blackish brown; fins bright orange; pectoral filaments intense vermilion.

**Geographical Distribution:** Currently known from southern Papua New Guinea (Merauke River and Gulf of Papua) to northern Australia (Cambridge Gulf of Western Australia to Port Stuart of Northern Territory) (Fig. 64).

**Habitat and Biology:** Occurs in muddy estuaries and lower portions of rivers (Saville-Kent, 1889; Munro, 1964, 1967). According to Feltes *in* Carpenter and Niem (2001), hundreds of adults approaching breeding condition were taken in trawl on Medusa Banks at a depth of 9 m in January or February 1968.

**Size:** Maximum standard length at least 11 cm (Feltes, 1993).

**Interest to Fisheries:** None.

**Local Names:** PAPUA NEW GUINEA: Streamered tasselfish.

**Literature:** Feltes (1993); Feltes *in* Carpenter and Niem (2001).

**Remarks:** ***P. verekeri*** is one of the smallest polynemids. Munro (1964, 1967) suggested the possibility of ***Polynemus intermedius*** being a junior synonym of ***Parapolynemus verekeri***. Feltes (1993) later confirmed that synonymy on the basis of the types.

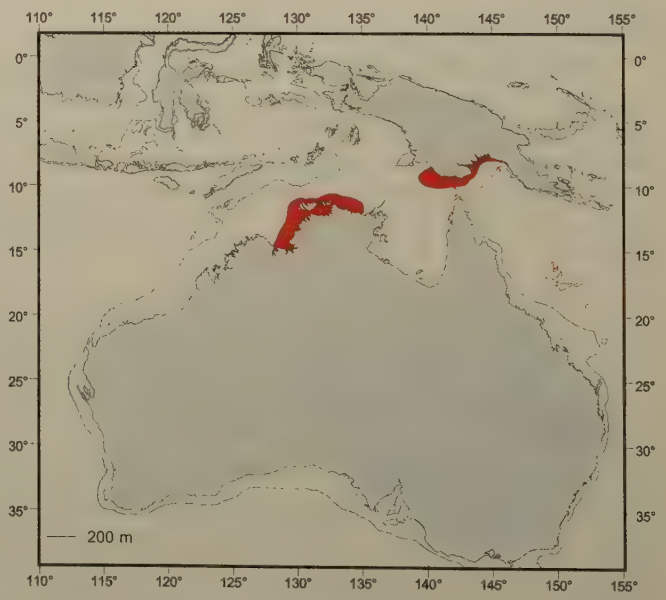



**Fig. 64** ***Parapolynemus verekeri***
Known distribution

## *Pentanemus* Günther, 1860

***Pentanemus*** Günther, 1860: 330 (type species: ***Polynemus quinquarius*** Linnaeus, 1758).

**Synonyms:** None.

**Species:** The genus comprises a single species:

***Pentanemus quinquarius***: West coast of Africa, Senegal to Angola.

**Remarks:** Günther (1860) proposed ***Pentanemus*** for ***Polynemus quinquarius*** on the basis of internal and external characters. ***Pentanemus*** differs from other genera in having the following characters: anal-fin rays 24 to 30 (less than 18 in all other genera); anal-fin base greater than head length (unique character among the family); width of tooth band on upper and lower jaws less than space (on symphysis) separating tooth bands on opposing premaxillae (this character also present in ***Filimanus***); posterior margin of preopercle not serrated (this character also present in ***Parapolynemus***).

## *Pentanemus quinquarius* (Linnaeus, 1758) **Fig. 65; Plate IIe**

***Polynemus quinquarius*** Linnaeus, 1758: 317 [type locality: America (but clearly erroneous); no types known, see Daget and Njock *in* Daget *et al.*, 1986].

**Synonyms:** ***Polynemus artedii*** Bennett, 1831: 146 (type locality: Atlantic coast of north Africa; no types known). ***Polynemus macronemus*** Pel, 1851: 9 [type locality: Gold Coast, Gulf of Guinea; 4 syntypes (RMNH 6016, 116 to 169 mm standard length)].

**FAO Names: En** - Royal threadfin; **Fr** - Capitaine royal; **Sp** - Barbudo real.

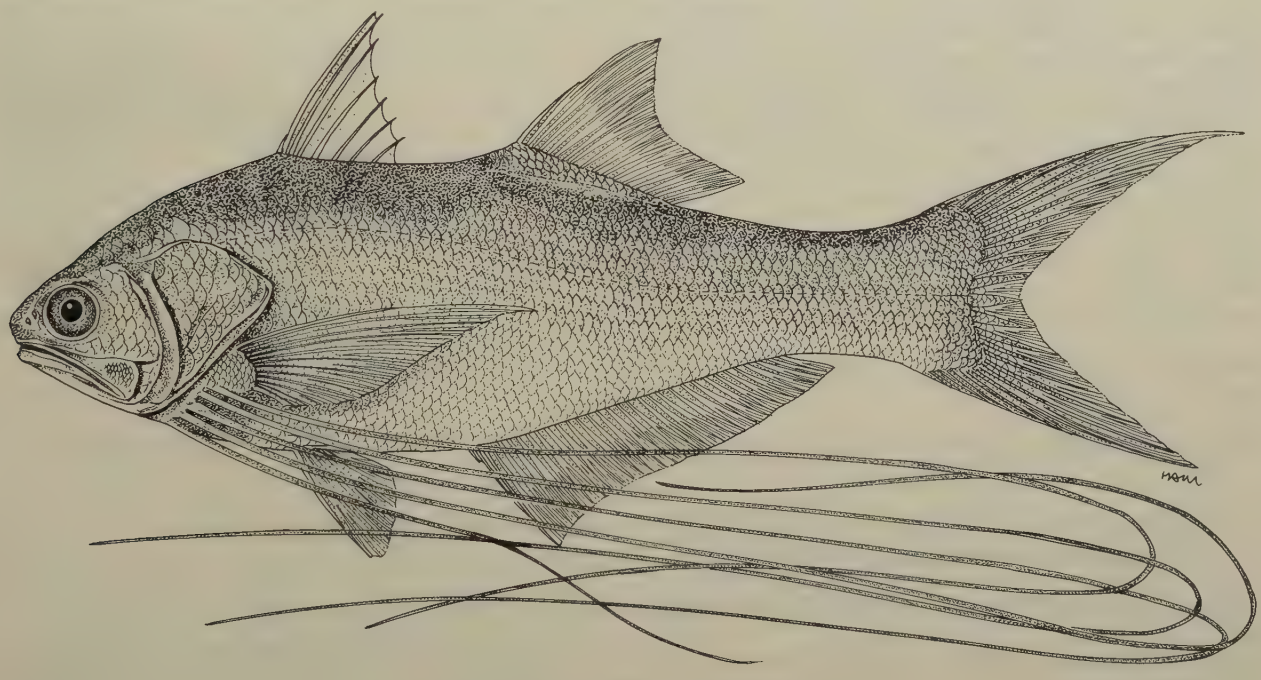


**Fig. 65** ***Pentanemus quinquarius***

**Diagnostic Features:** A medium-sized species. Body depth at first dorsal-fin origin 26 to 33% (mean 30%) of standard length; head length 27 to 31% (mean 30%) of standard length. Adipose eyelid poorly developed; eye diameter greater than snout length. Lip on lower jaw well developed, dentary teeth restricted to dorsal surface; width of tooth band on upper and lower jaws narrower than space (on symphysis) separating tooth bands on opposing premaxillae; teeth villiform in broad bands on jaws, palatines and ectopterygoids, tooth plates on palatines shorter than those on ectopterygoids; tooth plates on palatines conspicuously small; vomerine tooth plate covered with skin, teeth absent. Posterior margin of maxilla extending beyond level of posterior margin of adipose eyelid; upper-jaw length 14 to 15% (mean 14%) of standard length; maxillary

scales absent. Posterior margin of preopercle not serrated. Basisphenoid in contact with prootic; sphenotics not visible dorsally between anterior margins of parietal and pterotic. First dorsal fin with VIII spines; second dorsal fin with I spine and 14 or 15 (mode 15) soft rays; anal fin with III spines and 24 to 30 (mode 28) soft rays, anal-fin base longer than second dorsal-fin base; pectoral fin with 14 to 16 (mode 15) unbranched rays, its length 30 to 42% (mean 36%) of standard length, posterior tip reaching to or just short of level of midpoint of anal-fin base; pectoral-fin insertion well below midline of body; pectoral-fin base (including base of pectoral filaments) less than upper-jaw length; pectoral filaments 5; first filament shortest, just reaching to or extending beyond level of anal-fin origin; second to fifth pectoral filaments extending well beyond level of posterior tips of caudal-fin lobes; third pectoral filament longest, its length 242 to 296% (mean 266%) of standard length; caudal fin deeply forked, upper and lower caudal-fin lobes not filamentous, upper caudal-fin lobe 36 to 46% (mean 42%) and lower caudal-fin lobe 38 to 47% (mean 43%) of standard length. Pored lateral-line scales 68 to 76 (mode 72); lateral line simple, extending from upper end of gill opening to mid-distal margin of caudal-fin membrane; scale rows above lateral line 8 or 9 (mode 9), below 15 or 16 (mode 16). Gillrakers 18 to 23 on upper limb, 28 to 32 on lower limb, 47 to 53 total. Vertebrae 10 precaudal and 14 caudal; supraneural bones 3. Swimbladder present, well developed. **Colour:** Upper sides of head and trunk with golden tinge, becoming silver on lower sides; margins of first and second dorsal fins, and caudal fins black, remaining parts blackish; pelvic and anal fin white; pectoral fin yellow with melanophores; base of pectoral filaments white, becoming blackish on posterior tips.

**Geographical Distribution:** Generally distributed from Senegal to Angola, west coast of Africa (Fig. 66). Günther (1860) reported the species from Cuba, West Indies, on the basis of a single "half grown" specimen, but apparently no other western Atlantic specimens have been taken.

**Habitat and Biology:** Generally taken on muddy bottoms in shallow coastal waters from depths of 10 to 70 m, and frequently found in estuaries and lagoons. Generally feeds on crustaceans and small fishes (Longhurst, 1960: table 1).

Longhurst (1965) studied the biology, including sexuality and growth, of ***P. quinquarius*** in Lagos, Nigeria. The species has a normal bisexual reproductive cycle, the sex composition of 25 292 adult specimens: males 44.96%, hermaphrodites less than 0.01%, and females 55.04%. Spawning occurs in all months, peaking in the dry season and almost ceasing during the rainy season in Nigerian waters. Matures at less than 6 months of age (about 150 mm total length). At 3 months, the species averages 100 mm total length, 175 mm at 6 months and about 250 mm at 1 year. According to Longhurst (1965), it is unlikely that many individuals survive a second year of life.

**Size:** Maximum total length 35 cm, common to 25 cm (Allen *in* Fischer *et al.*, 1981).

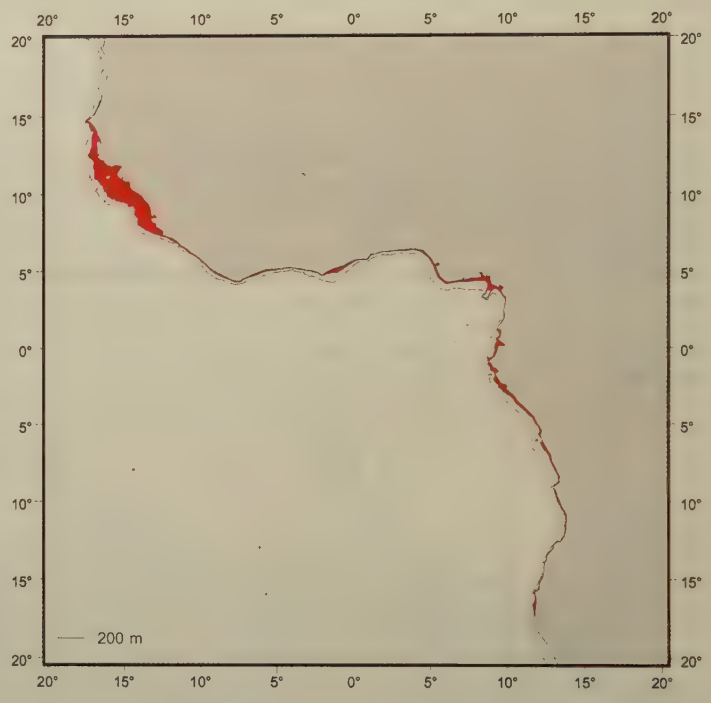



**Fig. 66** ***Pentanemus quinquarius***
Known distribution

**Interest to Fisheries:** One of the most important fisheries' species off the west coast of Africa. Caught mainly by trawl, but sometimes by gill net and beach seine.

**Local Names:** ANGOLA: Barbudo; CAPE VERDE: Barbudo-real; GHANA: Sikor, Threadfin; GUINEA: Gbalakassa; SENEGAL: Capitaine, Njaane, Njaane jaara; SIERRA LEONE: Bearbear, Beardfish.

**Literature:** Allen *in* Fischer *et al.* (1981); Daget and Njock *in* Daget *et al.* (1986); Njock *in* Quéro *et al.* (1990).

**Remarks:** ***Polynemus artedii*** and ***P. macronemus*** have been treated as junior synonyms of ***Pentanemus quinquarius*** (e.g. Daget and Njock *in* Daget *et al.*, 1986; Njock *in* Quéro *et al.*, 1990). Although Bennett (1831) gave no indication of any type specimens, he stated that ***Polynemus artedii*** has 25 anal-fin soft rays, which is diagnostic of ***Pentanemus quinquarius*** (this count not found in all other members of the family). Examination of types of ***Polynemus macronemus*** also showed them to be conspecific with ***Pentanemus quinquarius***.

## *Polydactylus* Lacepède, 1803

*Polydactylus* Lacepède, 1803: 419 [type species: *Polydactylus plumierii* Lacepède, 1803, presently regarded as a junior synonym of *Polydactylus virginicus* (Linnaeus, 1758)].

**Synonyms:** None.

**Diagnostic Features:** Body oblong to moderately deep. Adipose eyelid well developed; eye diameter greater than snout length. Lip on lower jaw well developed, dentary teeth restricted to dorsal surface except in adults of *Polydactylus opercularis* (in adults of *P. opercularis*, anterior one-third of lower jaw with small teeth extending onto lateral surface, adjacent portion of lip poorly developed); width of tooth band on upper and lower jaws greater than space (on symphysis) separating tooth bands on opposing premaxillae; teeth villiform in broad bands on jaws, palatines and ectopterygoids; vomerine tooth plate without teeth in some species. Posterior margin of maxilla just short of, reaching to, or extending beyond level of posterior margin of adipose eyelid. Posterior margin of preopercle serrated. Basisphenoid in contact with prootic; sphenotics not visible dorsally between anterior margins of parietal and pterotic. First dorsal fin with VIII spines; second dorsal fin with I spine and 11 to 15 soft rays; anal fin with III spines and 10 to 18 soft rays; anal-fin base less than head length; pectoral fin with 12 to 18 rays; pectoral-fin insertion well below midline of body; pectoral-fin base (including base of pectoral filaments) less than upper-jaw length; pectoral filaments 4 to 9, not extending beyond level of posterior tip of caudal fin; caudal fin deeply forked, upper and lower caudal-fin lobes not filamentous. Pored lateral-line scales 45 to 94; scale rows above lateral line 5 to 11, below 8 to 16. Gillrakers 21 to 38. Vertebrae 10 precaudal and 14 caudal; supraneural bones 2 or 3. Swimbladder present or absent.

**Habitat and Biology:** *Polydactylus* species are generally found on sandy or muddy bottoms in coastal waters and estuaries, and in depths of 1 to 150 m. Only a single species, *Polydactylus macrophthalmus*, occurs in complete fresh-water rivers on the Indonesian islands. Most species of *Polydactylus* are epibenthic predators feeding on crustaceans and fishes on or near the bottom. The reproduction of a few species has been studied, and they appear to be protandrous, sex changing from male to female with growth.

**Geographic Distribution:** The genus is widely distributed in tropical and subtropical latitudes of all oceans, but has never been recorded in the Red Sea or Mediterranean. Fourteen species occur in the Indo-Pacific, 2 species are known from the eastern Pacific, 3 species are found in the western Atlantic, and 1 species occurs in the eastern Atlantic.

**Interest to Fisheries:** The species of *Polydactylus* are among the most important commercial fishes in tropical fisheries of the world. Especially, in the middle East, South Asia and Southeast Asia, they are among the highest priced species in fish markets. A few species (e.g. *Polydactylus quadrifilis* and *P. macrochir*) are known as important sport fishes. *Polydactylus sexfilis* is cultivated in Hawaii.

**Species:** The genus comprises 20 species:

*Polydactylus approximans*: California to Peru (eastern Pacific)

*Polydactylus bifurcus*: Indonesia (Indo-Pacific)

*Polydactylus longipes*: Philippines (western Pacific)

*Polydactylus macrochir*: Northern Australia and southern Papua New Guinea (Indo-Pacific)

*Polydactylus macrophthalmus*: Indonesia (western Pacific)

*Polydactylus malagasyensis*: East coast of Africa (Indian Ocean)

*Polydactylus microstomus*: Sri Lanka to New Caledonia (Indo-Pacific)

*Polydactylus mullani*: Arabian Sea (Indian Ocean)

*Polydactylus multiradiatus*: Northern Australia and southern Papua New Guinea (Indo-Pacific)

*Polydactylus nigripinnis*: Northern Australia and southern Papua New Guinea (Indo-Pacific)

*Polydactylus octonemus*: New York to Yucatán (western Atlantic)

*Polydactylus oligodon*: Florida to Brazil (western Atlantic)

*Polydactylus opercularis*: California to Peru (eastern Pacific)

*Polydactylus persicus*: Persian Gulf (Indian Ocean)

*Polydactylus plebeius*: South Africa to Polynesia (Indo-Pacific)

*Polydactylus quadrifilis*: Eastern Atlantic

*Polydactylus sexfilis*: Mauritius to Pitcairn Island (Indo-Pacific)

*Polydactylus sextarius*: India to Papua New Guinea (Indo-Pacific)

*Polydactylus siamensis*: Thailand (Indo-Pacific)

*Polydactylus virginicus*: New Jersey to Brazil (western Atlantic)

**Remarks:** ***Polydactylus plumierii***, described as a new genus and species by Lacepède (1803), is presently regarded as a junior synonym of ***Polydactylus virginicus***. ***Polydactylus*** differs from other genera in having the following combination of characters: eye diameter 1.3 or less in snout length (1.3 or more in ***Parapolynemus*** and ***Polynemus***); width of tooth band on upper and lower jaws greater than space separating tooth bands on opposing premaxilla (narrower in ***Filimanus*** and ***Pentanemus***); lip of anterior parts of lower jaw well or poorly developed (absent in ***Eleutheronema***); basisphenoid in contact with prootic (not in contact in ***Filimanus***); pectoral-fin base, including base of pectoral filaments, less than upper-jaw length (greater in ***Galeoides***); anal-fin soft rays less than 18 (more than 24 in ***Pentanemus***); swimbladder absent or simple, not extending beyond anal-fin origin (swimbladder with many appendages in ***Leptomelanosoma*** and extending beyond anal-fin origin in ***Galeoides***).

## Key to the Indo-Pacific Species of *Polydactylus*

**1a.** A large black spot present anteriorly on lateral line . . . . . →*2*

**1b.** No large black spot anteriorly on lateral line . . . . . →*6*

**2a.** Pectoral filaments 5; body and fins tinged with yellowish silver (Fig. 67, Plate IIId) . . . ***Polydactylus microstomus*** (India to New Caledonia)

**2b.** Pectoral filaments 6 or 7; body and fins tinged with silver . . . . . →*3*

**3a.** Pectoral filaments 7; second spine of first dorsal fin more robust than other dorsal-fin spines (Fig. 68, Plate IIIe) . . . . . ***Polydactylus mullani*** (northern Arabian Sea)

**3b.** Pectoral filaments 6; all first dorsal-fin spines of similar thickness . . . . . →*4*

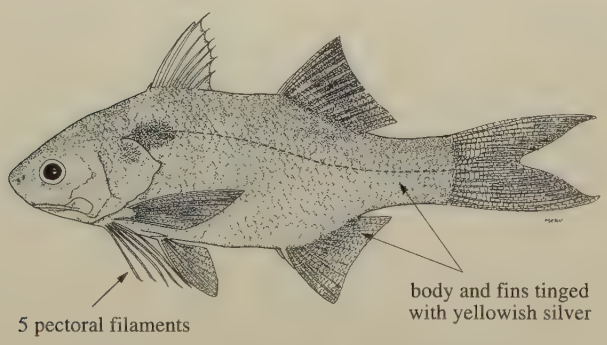



**Fig. 67** ***Polydactylus microstomus***

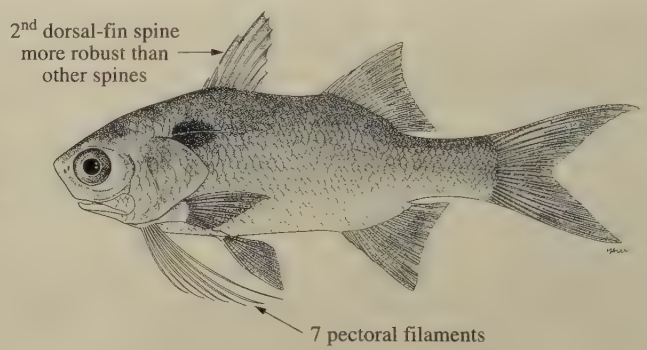



**Fig. 68** ***Polydactylus mullani***

**4a.** Gillrakers 25 to 30 (mode 28); second dorsal-fin spine short (mean 6% of standard length); swimbladder atrophied (Fig. 69, Plates Ve-f) . . . . . ***Polydactylus sextarius*** (India to Papua New Guinea)

**4b.** Gillrakers 29 to 35 (mode 31); second dorsal-fin spine long (mean 7% of standard length); swimbladder well-developed . . . . . →*5*

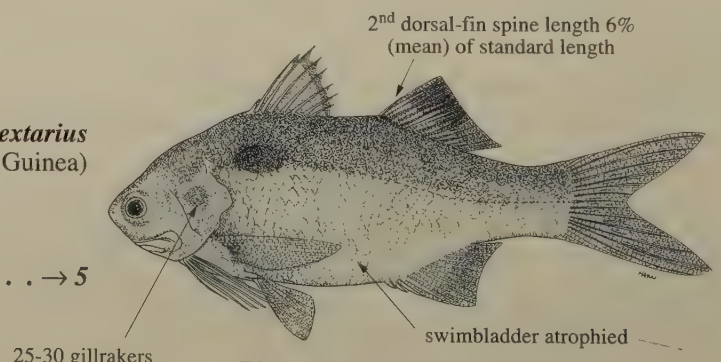



**Fig. 69** ***Polydactylus sextarius***

**5a.** Pectoral-fin rays 14; scale rows below lateral line 10 (rarely 9); palatines inwardly turned anteriorly; pectoral fin long (mean 24% of standard length); pectoral filaments short (mean 29% of standard length) (Fig. 70, Plate IIIc) . . . . . ***Polydactylus malagasyensis***
(east coast of Africa and Madagascar)

**5b.** Pectoral-fin rays 12 to 14 (mode 12); scale rows below lateral line 9 (rarely 8); palatines straight anteriorly; pectoral fin short (mean 19% of standard length); pectoral filaments long (mean 32% of standard length) (Fig. 71, Plate IVc) . . . . . ***Polydactylus persicus***
(Persian Gulf)

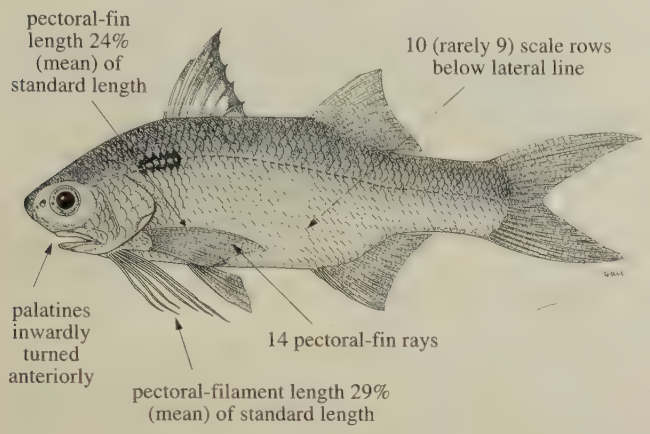

pectoral-fin length 24% (mean) of standard length
10 (rarely 9) scale rows below lateral line
palatines inwardly turned anteriorly
14 pectoral-fin rays
pectoral-filament length 29% (mean) of standard length

Fig. 70 *Polydactylus malagasyensis*

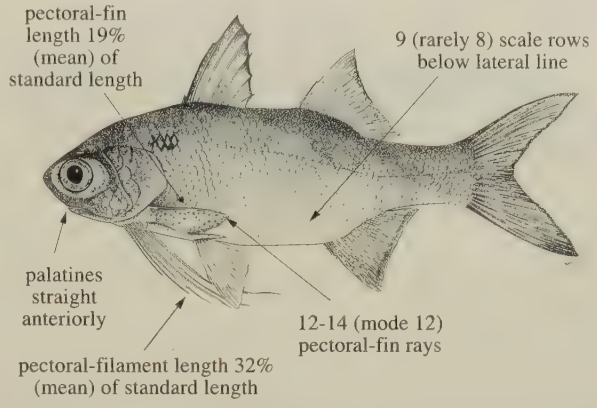

pectoral-fin length 19% (mean) of standard length
9 (rarely 8) scale rows below lateral line
palatines straight anteriorly
12-14 (mode 12) pectoral-fin rays
pectoral-filament length 32% (mean) of standard length

Fig. 71 *Polydactylus persicus*

**6a.** Pectoral filaments 5 . . . . . → *7*
**6b.** Pectoral filaments 6 or 7 . . . . . → *10*

**7a.** Posterior margin of maxilla extending considerably beyond level of posterior margin of adipose eyelid; occipital profile concave in adults (Fig. 72, Plate IIIa) . . . . . ***Polydactylus macrochir***
(northern Australia and southern Papua New Guinea)

**7b.** Posterior margin of maxilla reaching to or extending only slightly beyond level of posterior margin of adipose eyelid; occipital profile nearly straight throughout life . . . . . → *8*

**8a.** Lateral line bifurcated on caudal-fin base, extending to posterior margins of upper and lower caudal-fin lobes; second spine of first dorsal fin more robust than other spines (Fig. 73, Plate IIg) . . . ***Polydactylus bifurcus***
(Indonesia)

**8b.** Lateral line unbranched on caudal-fin base, extending to posterior margins of lower caudal-fin lobe; thickness of all spines of first dorsal fin similar . . . . . → *9*

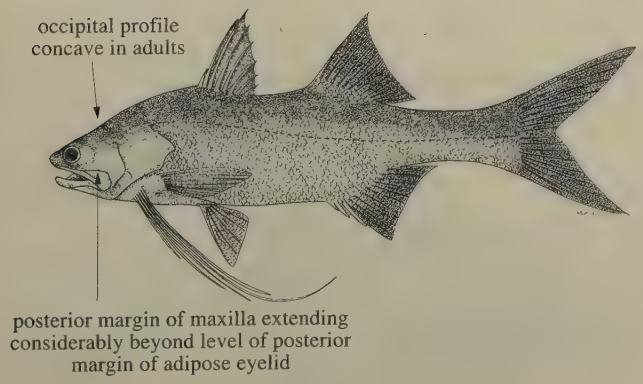

occipital profile concave in adults
posterior margin of maxilla extending considerably beyond level of posterior margin of adipose eyelid

Fig. 72 *Polydactylus macrochir*

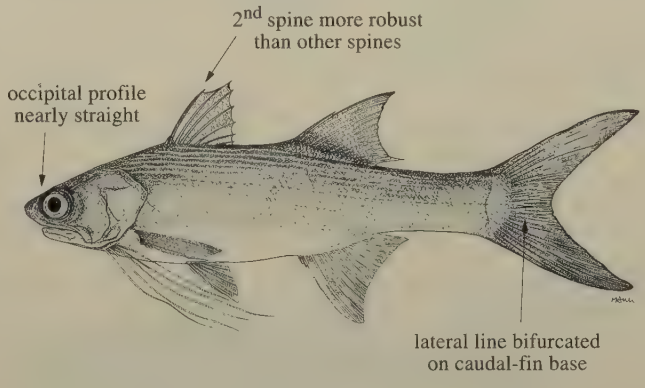



Fig. 73 *Polydactylus bifurcus*

**9a.** Pored lateral-line scales 60 to 68 (mode 63); gillrakers 24 to 32 (mode 26); scale rows above lateral line 8 or 9 (mode 8), below 12 or 13 (mode 12); upper jaw short (mean 15% of standard length) (Fig. 74, Plates IVd-h) . . . . . ***Polydactylus plebeius***
(South Africa to French Polynesia)

**9b.** Pored lateral-line scales 54 to 58 (mode 54); gillrakers 22 to 24 (mode 23); scale rows above lateral line 7, below 10 or 11 (mode 11); upper jaw long (mean 17% of standard length) (Fig. 75, Plate Vg) . . . . . ***Polydactylus siamensis***
(Thailand)

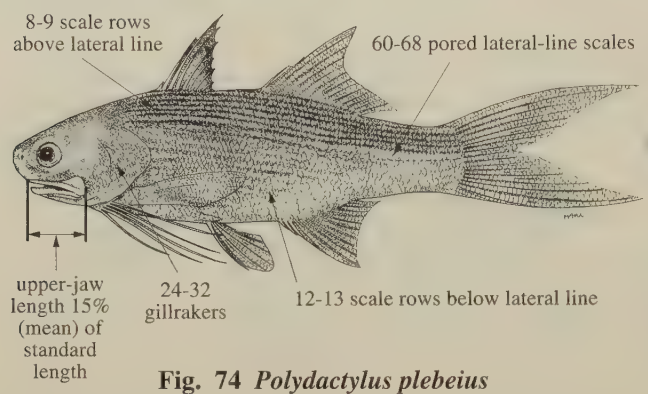

8-9 scale rows above lateral line
60-68 pored lateral-line scales
upper-jaw length 15% (mean) of standard length
24-32 gillrakers
12-13 scale rows below lateral line

**Fig. 74** ***Polydactylus plebeius***

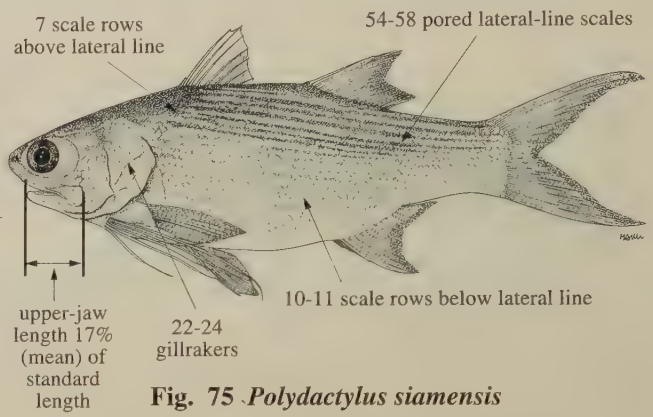

7 scale rows above lateral line
54-58 pored lateral-line scales
upper-jaw length 17% (mean) of standard length
22-24 gillrakers
10-11 scale rows below lateral line

**Fig. 75** ***Polydactylus siamensis***

**10a.** Longest pectoral filament extending beyond level of midpoint of caudal peduncle . . . . . → ***11***
**10b.** Longest pectoral filament not reaching to level of midpoint of caudal peduncle . . . . . → ***12***

**11a.** Pectoral filaments 6; pored lateral-line scales 54 or 55 (mode 55); scale rows above lateral line 6, below 11; gillrakers 31 or 32 (mode 31) (Fig. 76, Plate IIh) . . . . . ***Polydactylus longipes***
(Philippines)

**11b.** Pectoral filaments 7; pored lateral-line scales 87 to 94 (mode 88); scale rows above lateral line 10 to 12 (mode 11), below 15 or 16 (mode 16); gillrakers 25 to 29 (mode 27) (Fig. 77, Plate IIIb) . . . . . ***Polydactylus macrophthalmus***
(Indonesia)

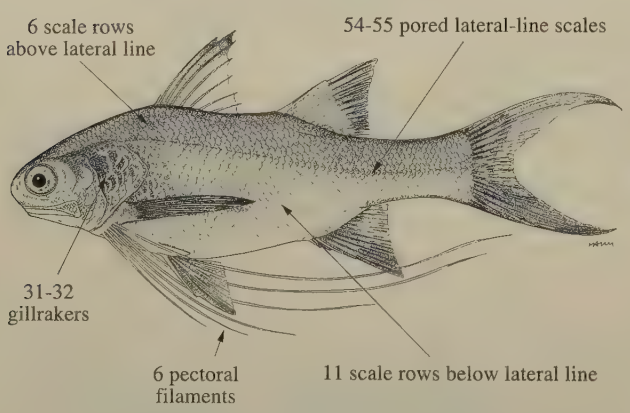

6 scale rows above lateral line
54-55 pored lateral-line scales
31-32 gillrakers
6 pectoral filaments
11 scale rows below lateral line

**Fig. 76** ***Polydactylus longipes***

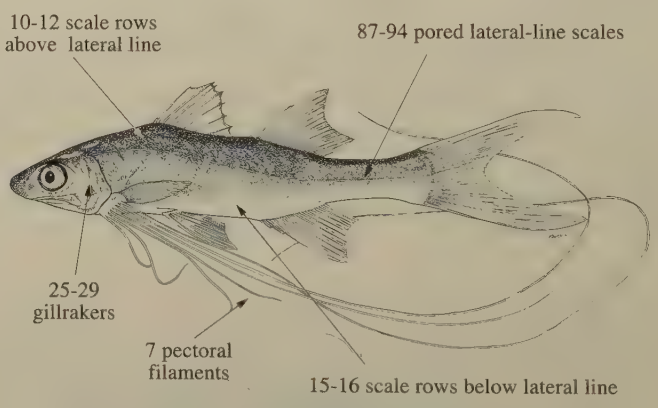

10-12 scale rows above lateral line
87-94 pored lateral-line scales
25-29 gillrakers
7 pectoral filaments
15-16 scale rows below lateral line

**Fig. 77** ***Polydactylus macrophthalmus***

**12a.** Anal-fin soft rays 16 to 18 (mode 16); pectoral filaments 7 (rarely 6) (Fig. 78, Plate IIIf) . . . . . ***Polydactylus multiradiatus***
(northern Australia and southern Papua New Guinea)

**12b.** Anal-fin soft rays 11 or 12; pectoral filaments 6 . . . . . → ***13***

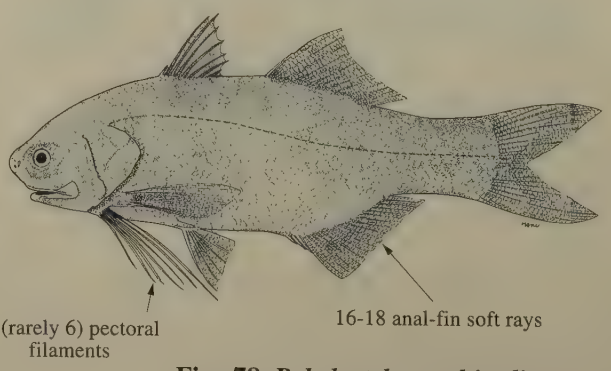



**Fig. 78** ***Polydactylus multiradiatus***

**13a.** Vomer without teeth; pored lateral-line scales 46 to 50 (mode 47); swimbladder absent; orbit diameter small (mean 6% of standard length) (Fig. 79, Plate IIIg) . . . . . ***Polydactylus nigripinnis***
(northern Australia, and southern Indonesia and Papua New Guinea)

**13b.** Vomer with teeth; pored lateral-line scales 61 to 67 (mode 64); swimbladder present; orbit diameter large (mean 9% of standard length) (Fig. 80, Plates Vb-d) . . . . . ***Polydactylus sexfilis***
(Mauritius to Pitcairn Island)

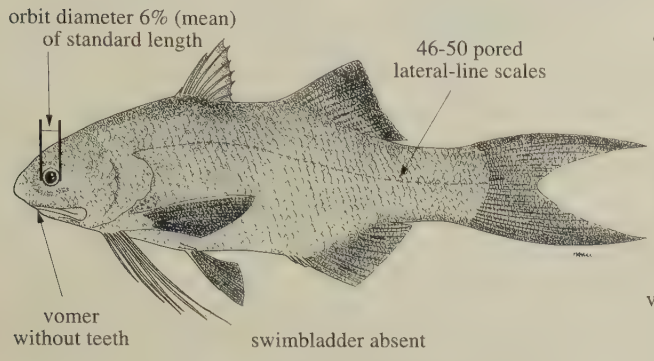



**Fig. 79** ***Polydactylus nigripinnis***

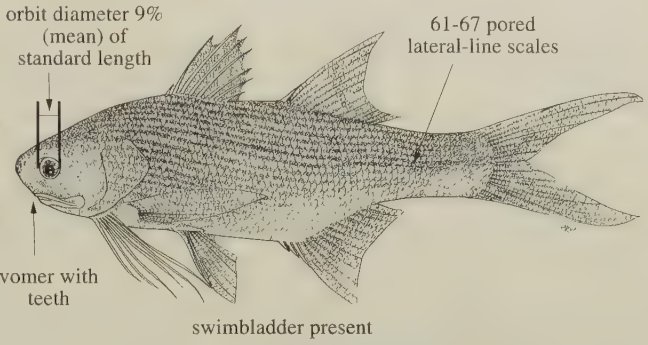



**Fig. 80** ***Polydactylus sexfilis***

## Key to the Eastern Pacific Species of *Polydactylus*

**1a.** Pectoral filaments 6 (rarely 5 or 7); pored lateral-line scales 56 to 63 (mode 60); gillrakers 26 to 31 (mode 30); lateral line bifurcated on caudal-fin base, extending to posterior margins of upper and lower caudal-fin lobes (Fig. 81, Plate IIf) . . . . . ***Polydactylus approximans***
(California to Peru)

**1b.** Pectoral filaments 9 (rarely 8); pored lateral-line scales 66 to 74 (mode 70); gillrakers 31 to 37 (mode 34); lateral line unbranched on caudal-fin base, extending to posterior margins of lower caudal-fin lobe (Fig. 82, Plate IVb) . . . . . ***Polydactylus opercularis***
(California to Peru)

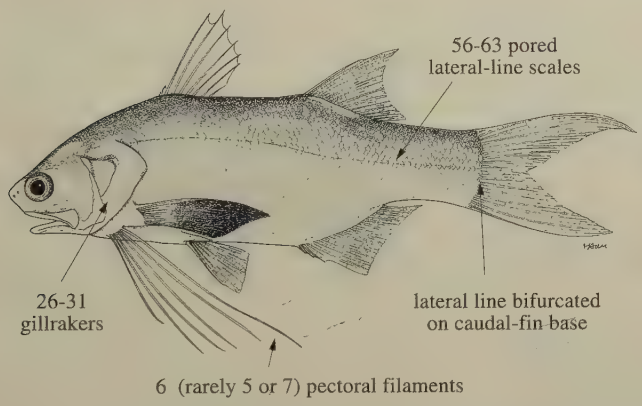

56-63 pored lateral-line scales
26-31 gillrakers
lateral line bifurcated on caudal-fin base
6 (rarely 5 or 7) pectoral filaments

**Fig. 81** ***Polydactylus approximans***

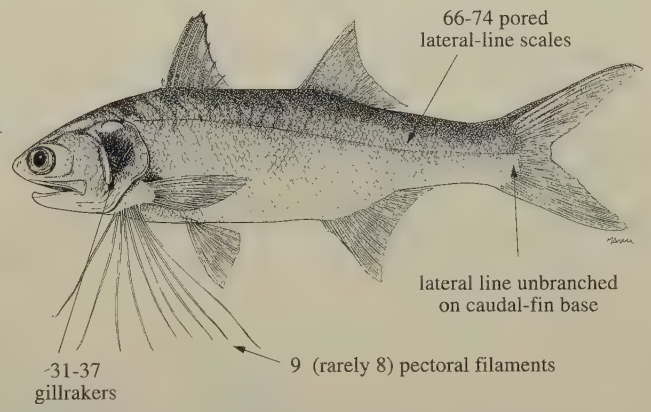

66-74 pored lateral-line scales
lateral line unbranched on caudal-fin base
31-37 gillrakers
9 (rarely 8) pectoral filaments

**Fig. 82** ***Polydactylus opercularis***

## Key to the Atlantic Species of *Polydactylus*

**1a.** Pectoral filaments 4 (Fig. 83, Plate Va) . . . . . ***Polydactylus quadrifilis***
(Senegal to the Congo, east coast of Africa)

**1b.** Pectoral filaments 7 or 8 (rarely 9) . . . . . → *2*

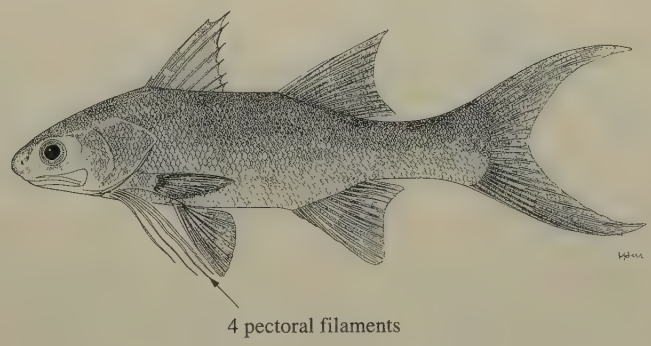



**Fig. 83** ***Polydactylus quadrifilis***

**2a.** Pectoral filaments 8 (rarely 9); gillrakers 34 to 38 (mode 36) (Fig. 84, Plate IIIh) . . . . . ***Polydactylus octonemus***
(New York to Yucatán, western Atlantic)

**2b.** Pectoral filaments 7 (rarely 8); gillrakers 22 to 30 (mode 27 or 28) . . . . . → *3*

**3a.** Pored lateral-line scales 67 to 73 (mode 70); anal-fin soft rays 13 to 15 (mode 14) (Fig. 85, Plate IVa) . ***Polydactylus oligodon***
(Florida to Brazil, western Atlantic)

**3b.** Pored lateral-line scales 54 to 63 (mode 58); anal-fin soft rays 11 to 14 (mode 13) (Fig. 86, Plate Vh) . ***Polydactylus virginicus***
(New Jersey to Brazil, western Atlantic)

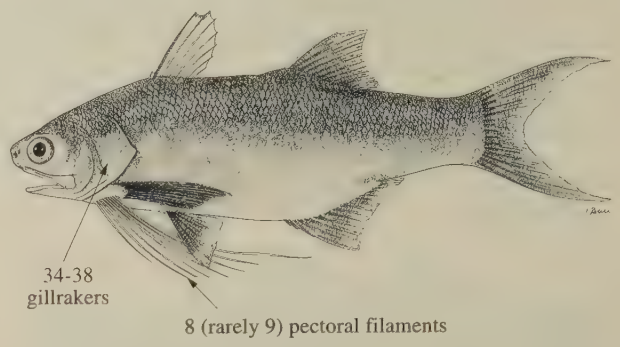



**Fig. 84** ***Polydactylus octonemus***

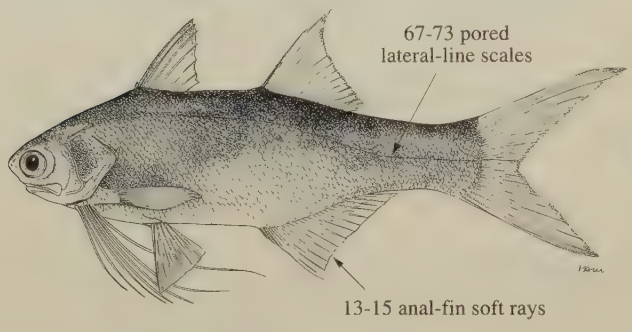



**Fig. 85** ***Polydactylus oligodon***

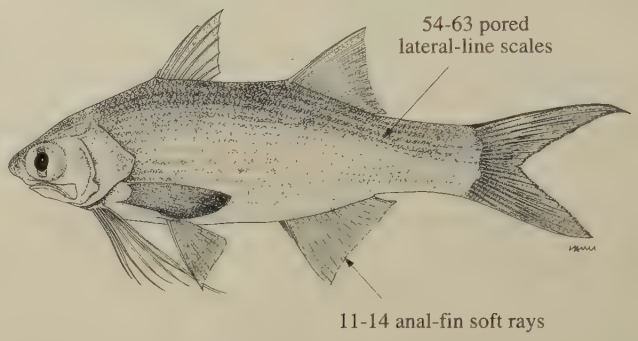



**Fig. 86** ***Polydactylus virginicus***

## ***Polydactylus approximans*** (Lay and Bennett, 1839) **Fig. 87; Plate IIf**

***Polynemus approximans*** Lay and Bennett, 1839: 57 [type locality: San Blas and Mazatlán, Mexico, based on a brief sketch and description by Mr Collie; type material apparently lost, see Motomura, Kimura and Iwatsuki, 2002].

**Synonyms:** ***Polynemus californiensis*** Thominot, 1886: 161 [type locality: California, USA; holotype (MNHN 1884-487, 179 mm standard length)].

**FAO Names: En** - Blue bobo; **Fr** - Barbure bleu; **Sp** - Barbudo azul.

**Fig. 87** ***Polydactylus approximans***

**Diagnostic Features:** A medium-sized species. Body depth at first dorsal-fin origin 25 to 32% (mean 30%) of standard length; head length 28 to 35% (mean 31%) of standard length. Snout pointed; occipital profile nearly straight in young, becoming somewhat concave with growth. Posterior margin of maxilla not reaching to or extending slightly beyond level of posterior margin of adipose eyelid; maxilla not covered with scales; upper-jaw length 13 to 15% (mean 14%) of standard length; depth of posterior margin of maxilla less than eye diameter; lip on lower jaw well developed, dentary teeth restricted to dorsal surface; teeth villiform in broad bands on vomer, palatines and ectopterygoids; shape of vomerine tooth plate crescentic or elliptic. Posterior margin of preopercle serrated. First dorsal fin with VIII spines, thickness of all first dorsal-fin spine bases similar; second dorsal fin with I spine and 11 to 13 (mode 12) soft rays; anal fin with III spines and 13 to 15 (mode 14) soft rays, anal-fin base greater than second dorsal-fin base; pectoral fin with 14 to 16 (mode 15) rays (all rays unbranched), its length 24 to 32% (mean 28%) of standard length, posterior tip not reaching to or extending beyond level of posterior tip of pelvic fin; pectoral filaments 6 (rarely 5 or asymmetrically 6 and 7), first filament shortest, just reaching to or extending slightly beyond level of pelvic-fin origin; second to fourth pectoral filaments extending beyond level of pelvic-fin origin; length of fifth pectoral filament variable, from not reaching level with posterior margin of pelvic fin to just reaching level with anal-fin origin; sixth pectoral filament longest, its length 35 to 48% (mean 41%) of standard length, just short of level of anal-fin origin or reaching to near midpoint of anal-fin base; caudal fin deeply forked, upper and lower caudal-fin lobes not filamentous, upper caudal-fin lobe 37 to 43% (mean 40%) and lower lobe 35 to 40% (mean 37%) of standard length. Pored lateral-line scales 56 to 63 (mode 60); lateral line bifurcated on caudal-fin membranes, extending to posterior margins of upper and lower caudal-fin lobes; scale rows above lateral line 7 or 8 (mode 7), below 11 to 13 (mode 12). Gillrakers 11 to 14 (mode 13) on upper limb, 15 to 18 (mode 17) on lower limb, 26 to 31 (mode 30) total. Vertebrae 10 precaudal and 14 caudal; supraneural bones 3. Swimbladder present, small. **Colour:** Head and body grey dorsally, silver ventrally; anterior margins of first and second dorsal fins black, remaining parts dusky; pectoral fin dusky; base of pectoral filaments white, becoming blackish on posterior tips; base and posterior margin of pelvic fin white, remaining parts dusky; posterior margin of anal fin white, remaining parts dusky; margins of caudal fin black, remaining parts dusky.

**Geographical Distribution:** Currently known from the eastern Pacific Ocean, where it ranges from Monterey Bay, California, USA to Callao, Peru (Fig. 88), being relatively common in the Central American region in latitudes between 5° and 20°N. Grove and Lavenberg (1997) reported a single small example (LACM W53-178) collected from the Galápagos Islands, and is considered to occur rarely around the islands. Although Pequeño (1989) listed ***P. approximans*** and ***P. opercularis*** from Chile, such records remain unsubstantiated.

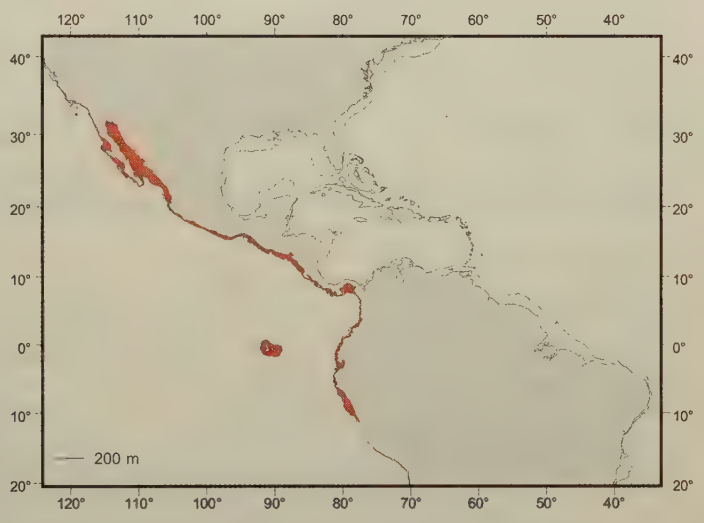



**Fig. 88** ***Polydactylus approximans***
Known distribution

**Habitat and Biology:** Although ***P. approximans*** generally inhabits muddy or sandy bottoms in coastal waters and estuaries, larvae and juveniles (less than about 40 mm standard length) sometimes occur at the water surface several hundred kilometres offshore (Grove and Lavenberg, 1997). Most of the collection data available indicated the specimens as having been taken from depths less than 30 m. According to Grove and Lavenberg (1997), the species is omnivorous, feeding on worms, sand crabs, shrimp, clams, and sometimes fish like small anchovy.

**Size:** Maximum total length at least 35 cm (Allen and Robertson, 1994).

**Interest to Fisheries:** Esteemed as a food fish throughout the tropical eastern Pacific.

**Local Names:** COLOMBIA: Barbeta; EQUADOR: Aguapuro; MEXICO: Barbudo azul; NICARGUA: Barbudo seis barbas.

**Literature:** Motomura, Kimura and Iwatsuki (2002).

**Remarks:** ***P. californiensis***, originally described by Thominot (1886) from California, USA on the basis of a single specimen (MNHN 1884-487, 179 mm standard length), was recently synonymized under ***P. approximans***, originally described by Lay and Bennett (1839) on the basis of a brief sketch and description by Mr Collie (Motomura, Kimura and Iwatsuki 2002). Although Lay and Bennett (1839) quoted the absence of a swimbladder in the species from the brief description by Mr Collie, the presence of a swimbladder was confirmed by Motomura, Kimura and Iwatsuki (2002). The swimbladder was apparently overlooked by Mr Collie due to its very small size (about 13% of standard length).

***Polydactylus approximans*** and 6 Indo-Pacific ***Polydactylus*** species, ***P. longipes***, ***P. malagasyensis***, ***P. nigripinnis***, ***P. persicus***, ***P. sexfilis*** and ***P. sextarius***, are characterized by having 6 pectoral filaments. However, ***P. approximans*** is distinguished from the other 6 species by having a bifurcated lateral line (unbranched in the latter). The lateral-line condition of ***P. approximans*** is also found in an Indian Ocean species, ***P. bifurcus***, and all 3 currently-recognized Atlantic west coast species, ***P. octonemus***, ***P. oligodon*** and ***P. virginicus***. ***Polydactylus approximans*** differs from the above 4 species in

having usually 6 pectoral filaments (5 in *P. bifurcus*, usually 7 in *P. oligodon* and *P. virginicus*, and usually 8 in *P. octonemus*.

*Polydactylus approximans* has the maxilla without scales, a character state also found in the 3 Atlantic west coast species and an African west coast species, *P. quadrifilis*. Other congeners (distributed in the Indo-Pacific and eastern Pacific) have the maxilla with deciduous scales, the size and number of scales being both intra- and interspecifically variable.

*Polydactylus approximans* and *P. opercularis* occur in the eastern Pacific Ocean. The former can be easily distinguished from the latter by having lower counts of pectoral filaments [6 on each side (rarely 5 on each side or asymmetrically 6 and 7) versus 9 on each side (rarely 8 on each side or asymmetrically 8 and 9) in the latter], pored lateral-line scales [56 to 63 (mode 60) versus 66 to 74 (mode 70)], scale rows above and below the lateral line [7 or 8 (mode 7) and 11 to 13 (mode 12) versus 7 to 10 (mode 8) and 12 to 15 (mode 13), respectively] and gillrakers [upper series 11 to 14 (mode 13), lower 15 to 18 (mode 17) and total 26 to 31 (mode 30) versus 13 to 18 (mode 16), 17 to 20 (mode 19) and 31 to 37 (mode 34), respectively], and higher counts of anal-fin soft rays [13 to 15 (mode 14) versus 12 to 14 (mode 13)].

In addition to the above meristic characters, *P. approximans* differs from *P. opercularis* in having the following distinct morphological characters: lip on lower jaw well developed, dentary teeth restricted to dorsal surface (anterior parts of lower jaw with villiform teeth extending onto lateral surface, adjacent portion of lip poorly developed in larger *P. opercularis*); maxilla not covered with scales (covered with small deciduous scales in *P. opercularis*); lateral line bifurcated on caudal-fin membranes, extending to posterior margins of upper and lower caudal-fin lobes (lateral line unbranched, extending to upper end of lower caudal-fin lobe in *P. opercularis*); swimbladder present (absent in *P. opercularis*).

## *Polydactylus bifurcus* Motomura, Kimura and Iwatsuki, 2001 — Fig. 89; Plate IIg

*Polydactylus bifurcus* Motomura, Kimura and Iwatsuki, 2001: 299, figs. 1-3 [type locality: Kuta beach, Lombok Island, Indonesia; holotype (NSMT-P 60494, 144 mm standard length)].

**Synonyms:** None.

**FAO Names: En** - Slender fivefinger threadfin; **Fr** - Barbure svelte; **Sp** - Barbudo esbelto.

**Fig. 89** *Polydactylus bifurcus*

**Diagnostic Features:** A medium-sized species. Body depth at first dorsal-fin origin 26 to 28% (mean 27%) of standard length; head length 27 to 28% (mean 28%) of standard length. Snout pointed; occipital profile nearly straight. Posterior margin of maxilla extending slightly beyond level of posterior margin of adipose eyelid; depth of posterior margin of maxilla less than eye diameter; upper-jaw length 14% of standard length; lip on lower jaw well developed, dentary teeth restricted to dorsal surface; teeth villiform in broad bands on vomer, palatines and ectopterygoids. Posterior margin of preopercle serrated. First dorsal fin with VIII spines, second spine more robust than others; second dorsal fin with I spine and 13 soft rays; anal fin with III spines and 11 or 12 (mode 11) soft rays, anal-fin base approximately equal to second dorsal-fin base; pectoral fin with 15 rays (several rays branched), its length 19 to 21% (mean 20%) of standard length, posterior tip not reaching to level of posterior tip of pelvic fin; pectoral filaments 5, first filament shortest, not extending beyond level of

posterior tip of pelvic fin; second, third, and fifth filaments not extending beyond level of posterior tip of pelvic fin; fourth filament longest, its length 35 to 38% (mean 36%) of standard length, extending well beyond level of posterior tip of pelvic fin, but not reaching to level of anal-fin origin; caudal fin deeply forked, upper and lower caudal-fin lobes not filamentous, upper caudal-fin lobe 37 to 39% (mean 38%) and lower lobe 37% of standard length. Pored lateral-line scales 69 to 72; lateral line bifurcated on caudal-fin base, extending to posterior margins of upper and lower caudal-fin lobes; scale rows above lateral line 8 or 9 (mode 8), below 10 to 12 (mode 12). Gillrakers 12 or 13 (mode 13) on upper limb, 17 or 18 (mode 17) on lower limb, 30 total. Vertebrae 10 precaudal and 14 caudal; supraneural bones 3. Swimbladder present, well developed. **Colour:** Upper sides of head and trunk tinged silvery green, becoming more silver on lower sides; first and second dorsal fins dark green; pectoral fin white, becoming dark green on posterior tip; pectoral filaments and pelvic fin white; anterior part of anal fin dark green, remainder of fin white; upper, lower and posterior margins of caudal fin black, remainder of fin dark green (lower lobe darkest); 8 or 9 dark stripes along longitudinal scale rows above lateral line, 8 or 9 faint stripes below.

**Geographical Distribution:** Currently known only from the south coast of the Greater Sunda Islands: Nias, Java and Lombok Island (Fig. 90).

**Habitat and Biology:** Collection data for the holotype indicated that it was taken in shallow water (1.5 m) over a muddy bottom (Motomura, Kimura and Iwatsuki, 2001). No other data are available.

**Size:** Maximum standard length at least 27 cm (Motomura, 2002).

**Interest to Fisheries:** None.

**Local Names:** None known.

**Literature:** Motomura, Kimura and Iwatsuki (2001); Motomura (2002).

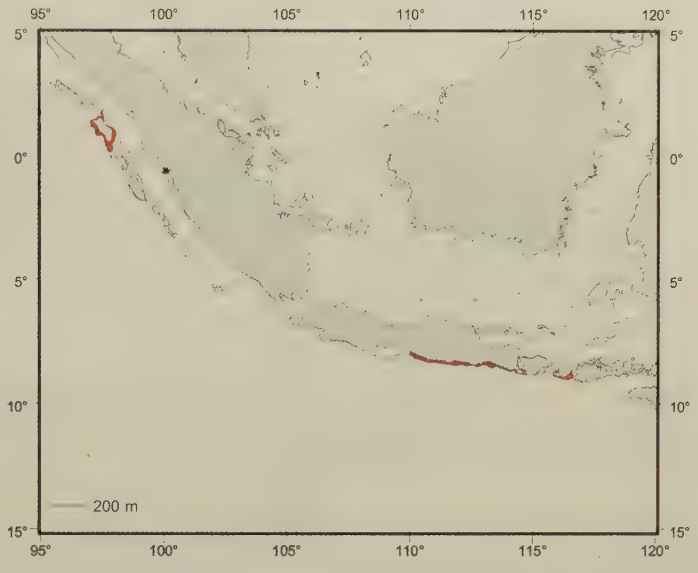



**Fig. 90** ***Polydactylus bifurcus***
Known distribution

**Remarks:** ***P. bifurcus*** can be distinguished from all other Indo-Pacific ***Polydactylus*** species by having the lateral line bifurcated on the caudal-fin base, extending to the posterior margins of the upper and lower caudal-fin lobes (an unbranched lateral line in all other ***Polydactylus***). However, 1 of 2 eastern Pacific species, ***P. approximans***, and all of 3 Atlantic west coast species, ***P. octonemus***, ***P. oligodon*** and ***P. virginicus***, have a similar lateral line condition to ***P. bifurcus***. ***Polydactylus bifurcus*** differs from the above 4 species in having 5 pectoral filaments (usually 6 in ***P. approximans***, 8 in ***P. octonemus***, and 7 in ***P. oligodon*** and ***P. virginicus***). ***Polydactylus approximans*** rarely has 5 pectoral filaments, but the species is clearly distinguished from ***P. bifurcus*** by the numbers of the pored lateral-line scales and anal-fin soft rays (55 to 60 and 13 or 14 versus 69 to 72 and 11 or 12, respectively, in the latter). The lateral lines of the other eastern Pacific species, ***P. opercularis***, and 1 West African species, ***P. quadrifilis***, are unbranched and extend to the upper end of the lower caudal-fin lobe.

Five species have been recognized as valid Indo-Pacific ***Polydactylus*** species with 5 pectoral filaments: ***P. bifurcus***, ***P. macrochir***, ***P. microstomus***, ***P. plebeius*** and ***P. siamensis***. ***Polydactylus bifurcus*** further differs from ***P. microstomus*** in having higher counts of pored lateral-line scales and scales above and below the lateral line (69 to 72 and 8 or 9 / 10 to 12, respectively versus 46 to 49 and 6 or 7 / 8 to 10, in the latter), fourth pectoral filaments longest (fifth longest in the latter), teeth present on the vomer (absent in the latter) and a large black spot absent anteriorly on the lateral line (present, in the latter).

Like ***P. bifurcus***, ***P. plebeius*** and ***P. siamensis*** are characterized by several dark stripes along the longitudinal scale rows above and below the lateral line and 5 pectoral filaments. However, ***P. bifurcus*** is distinguished from the others by having higher counts of the pored lateral-line scales (69 to 72 versus 60 to 66, rarely 68 and 54 to 58 in ***P. plebeius*** and ***P. siamensis***, respectively), fourth pectoral filaments longest (fifth longest in ***P. plebeius*** and ***P. siamensis***) and a very strong second spine of the first dorsal fin (more robust than other spines of first dorsal fin versus similar to other spines).

***Polydactylus bifurcus*** is similar to ***P. macrochir*** in having higher counts of pored lateral-line scales and scales above and below the lateral line, fourth pectoral filaments longest, teeth present on the vomer, and a very strong second spine of the first dorsal fin. However, the former differs from the latter in having the posterior margin of the maxilla extending slightly beyond the level of the posterior margin of the adipose eyelid (extending considerably beyond in the latter) and lower counts of gillrakers (30 versus 32 to 35 in ***P. macrochir***).

***Polydactylus bifurcus*** appears to be one of the rarest polynemids and only 3 specimens are present in museum collections (NSMT-P 60494, holotype, 144 mm standard length; ZMA 114-500, 272 mm standard length; ZMA 116-717, 199 mm standard length).

## *Polydactylus longipes* Motomura, Okamoto and Iwatsuki, 2001

**Fig. 91; Plate IIh**

*Polydactylus longipes* Motomura, Okamoto and Iwatsuki, 2001: 1087, fig. 1 [type locality: Davao market, Mindanao Island, Philippines; holotype (USNM 363173, 159 mm standard length); 2 paratypes (FSKU-P 19840, 134 mm standard length; MUFS 20290, 152 mm standard length)].

**Synonyms:** None.

**FAO Names: En** - Long-limb threadfin; **Fr** - Barbure longs-doigts; **Sp** - Barbudo de dedos largos.

**Fig. 91** ***Polydactylus longipes***

**Diagnostic Features:** A small- to medium-sized species. Body depth at first dorsal-fin origin 29 to 32% (mean 30%) of standard length; head length 35% of standard length. Snout pointed; occipital profile nearly straight. Posterior margin of maxilla reaching to level of posterior margin of adipose eyelid; upper-jaw length 17 to 18% (mean 17%) of standard length; depth of posterior margin of maxilla less than eye diameter; lip on lower jaw well developed, dentary teeth restricted to dorsal surface; teeth villiform in broad bands on vomer, palatines and ectopterygoids. Posterior margin of preopercle serrated. First dorsal fin with VIII spines, thickness of all first dorsal-fin spine bases similar; second dorsal fin with I spine and 12 soft rays; anal fin with III spines and 11 soft rays, anal-fin base slightly less than second dorsal-fin base; pectoral fin with 13 rays (all rays unbranched), its length 28 to 29% (mean 28%) of standard length, posterior tip reaching to or extending slightly beyond level of posterior tip of pelvic fin; pectoral filaments 6, first filament shortest, extending well beyond level of pelvic-fin origin; second pectoral filament reaching to or just short of level of posterior tip of pectoral fin; third pectoral filament reaching to or just short of level of anal-fin origin; fourth pectoral filament extending beyond midpoint of anal-fin base; fifth pectoral filament extending slightly beyond midpoint of caudal peduncle; sixth pectoral filament longest, its length 71 or 72% (mean 71%) of standard length, extending well beyond midpoint of caudal peduncle; caudal fin deeply forked, upper and lower caudal-fin lobes not filamentous, upper caudal-fin lobe 40 to 44% (mean 42%) and lower lobe 38 to 40% (mean 38%) of standard length. Pored lateral-line scales 54 or 55 (mode 55); lateral line simple, extending from upper end of gill opening to upper end of lower caudal-fin lobe; scale rows above lateral line 6, below 11. Gillrakers 13 or 14 (mode 13) on upper limb, 18 on lower limb, 31 or 32 (mode 31) total. Vertebrae 10 precaudal and 14 caudal; supraneural bones 3. Swimbladder present, well developed. **Colour:** Upper sides of head and trunk tinged greyish black, becoming lighter grey on lower sides; opercular region black; all spines of first dorsal fin black, tip of membrane between third and fifth spines black, interspinous membrane otherwise transparent; pectoral-fin membranes greyish black; posterior-most portions of second dorsal and anal fins white, all spines and first and second soft rays dusky, remainder greyish black; tip of anterior margin of pelvic fin white, remainder of fin dusky; pectoral filaments and caudal fin greyish black.

**Geographical Distribution:** Currently known only from Mindanao Island, Philippines (Fig. 92).

**Habitat and Biology:** No data are available.

**Size:** Maximum standard length at least 16 cm (Motomura, Okamoto and Iwatsuki, 2001).

**Interest to Fisheries:** None.

**Local Names:** None known.

**Literature:** Motomura, Okamoto and Iwatsuki (2001); Motomura (2002).

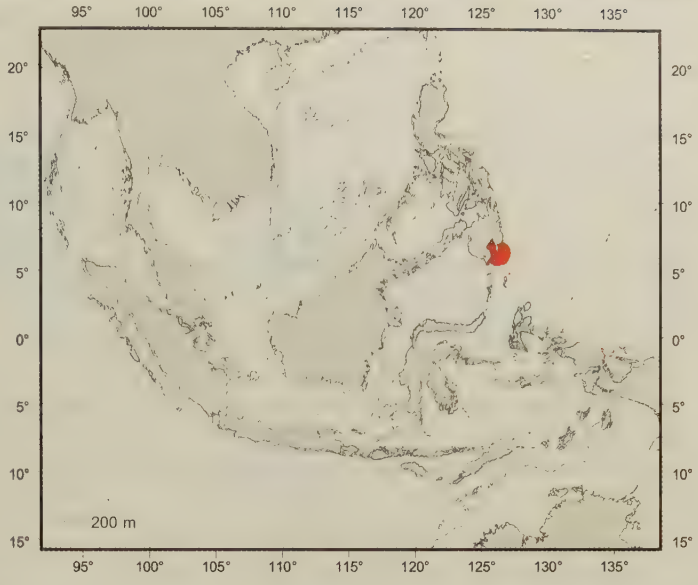



**Fig. 92** ***Polydactylus longipes***
Known distribution

**Remarks:** Although ***P. longipes*** is similar to ***P. macrophthalmus*** in having long pectoral filaments which extend well beyond the midpoint of the anal-fin base, ***P. longipes*** differs from the latter in having 6 pectoral filaments (7 in the latter). In ***P. longipes*** the upper 2 pectoral filaments extend beyond the midpoint of the caudal peduncle, not reaching the caudal-fin base. In ***P. macrophthalmus*** the upper 3 filaments extend beyond the caudal-fin base, the fifth extending beyond the caudal-fin lobe tip. Furthermore, ***P. longipes*** is clearly distinguished from ***P. macrophthalmus*** by lower dorsal-fin soft ray counts (12 versus 13 or 14 in the latter), fewer pored lateral-line scales (54 or 55 versus 87 to 94 in ***P. macrophthalmus***) and scales above and below the lateral line (6 and 11 versus 10 to 12 and 15 or 16, respectively), and higher gill-raker counts (31 or 32 versus 25 to 29 in ***P. macrophthalmus***).

***Polydactylus*** species with 6 pectoral filaments now include 6 valid species from the Indo-Pacific: ***P. longipes***, ***P. malagasyensis***, ***P. nigripinnis***, ***P. persicus***, ***P. sexfilis*** and ***P. sextarius***. ***Polydactylus nigripinnis*** further differs from ***P. longipes*** in having higher pectoral-fin ray counts [16 to 18 (mode 17) versus 13 in the latter], lower counts of pored lateral-line scales and gillrakers [46 to 50 (mode 47) and 24 to 29 (mode 27) versus 54 or 55 (mode 55) and 31 or 32 (mode 31), respectively], and vomerine teeth absent (present in ***P. longipes***).

***Polydactylus sexfilis*** differs from ***P. longipes*** in having higher counts of pectoral-fin rays [15 or 16 (mode 16) versus 13 in the latter], pored lateral-line scales [60 to 67 (mode 64) versus 54 or 55 (mode 55 in ***P. longipes***)], and scales above and below the lateral line [8 or 9 (mode 9) and 12 to 14 (mode 13) versus 6 and 11, respectively].

***Polydactylus malagasyensis***, ***P. persicus*** and ***P. sextarius*** are also clearly distinguished from ***P. longipes*** as follows: all pectoral-fin rays (except upper 1 or 2) branched (all unbranched in the latter), vomerine teeth absent (present), and a large black spot present anteriorly on the lateral line (absent).

***Polydactylus longipes*** appears to be one of the rarest polynemids, being known only from the 3 type specimens.

## ***Polydactylus macrochir*** (Günther, 1867)

**Fig. 93; Plate IIIa**

***Polynemus macrochir*** Günther, 1867: 60 [type locality: New South Wales, Australia (but probably Queensland, see Motomura *et al.*, 2000); holotype (BMNH 1866.2.13.17, 171 mm standard length)].

**Synonyms:** ***Polynemus sheridani*** Macleay, 1884: 21 (type locality: Mary River, Queensland, Australia; type material apparently lost, see Motomura *et al.*, 2000).

**FAO Names: En** - King threadfin; **Fr** - Barbure gros-doigts; **Sp** - Barbudo de manos grandes.

**Fig. 93** ***Polydactylus macrochir***

**Diagnostic Features:** A large species. Body depth at first dorsal-fin origin 23 to 28% (mean 25%) of standard length; head length 28 to 34% (mean 30) of standard length. Snout pointed; occipital profile nearly straight in young but concave in adults. Posterior margin of maxilla extending considerably beyond level of posterior margin of adipose eyelid; upper-jaw length 13 to 17% (mean 15%) of standard length; depth of posterior margin of maxilla greater than eye diameter in adults (over about 200 mm standard length); lip on lower jaw well developed and dentary teeth restricted to dorsal surface; teeth villiform in broad bands on vomer, palatines and ectopterygoids. Posterior margin of preopercle serrated. First dorsal fin with VIII spines, second spine more robust than others; second dorsal fin with I spine and 11 to 13 (mode 12) soft rays; anal fin with III spines and 10 to 12 (mode 11) soft rays, anal-fin base approximately equal to second dorsal-fin base; pectoral fin with 14 or 15 (mode 14) rays (all rays unbranched), its length 22 to 27% (mean 24%) of standard length, posterior tip just reaching to or not reaching to level of posterior tip of pelvic fin; pectoral filaments 5, first filament shortest, extending well beyond level of pelvic-fin origin; second pectoral filament extending well beyond level of posterior tip of pelvic fin; third and fifth pectoral filaments extending beyond level of anal-fin origin; fourth pectoral filament longest, its length 40 to 53% (mean 46%) of standard length, extending well beyond level of anal-fin origin; caudal fin deeply forked, upper and lower caudal-fin lobes not filamentous, upper caudal-fin lobe 33 to 41% (mean 35%) and lower lobe 31 to 46% (mean 33%) of standard length. Pored lateral-line scales 70 to 76 (mode 72); lateral line simple, extending from upper end of gill opening to upper end of lower caudal-fin lobe; scale rows above lateral line 8 to 11 (mode 9), below 12 to 15 (mode 12). Gillrakers 13 to 15 (mode 14) on upper limb, 18 to 20 (mode 20) on lower limb, 32 to 35 (mode 34) total. Vertebrae 10 precaudal and 14 caudal; supraneural bones 3. Swimbladder present, well developed. **Colour:** Upper sides of head and trunk tinged golden silver, becoming more silver on lower sides; first and second dorsal fins pale brown; pectoral and pelvic fins vivid yellow; anterior part of anal fin yellow, other parts yellowish white; pectoral filaments white or yellowish white; posterior margin of caudal fin greyish black, other parts greyish.

**Geographical Distribution:** Endemic to northern Australia and southern Papua New Guinea (Fig. 94). The species is currently known from Broome, Western Australia to Brisbane River, Queensland, northern Australia, and from south coast of Irian Jaya, Indonesia to south coast of Papua New Guinea. Girija Kumari, Ratnamala and Seshagiri-Rao (1985) reported that 9 specimens of ***Polydactylus macrochir*** (as ***Polynemus sheridani***) were collected from Bay of Bengal, India. However, the description of those specimens given by Girija Kumari, Ratnamala and Seshagiri-Rao (1985), which includes 19 gillrakers, caudal-fin lobes filamentous and greyish body colour, are closer to the diagnosis of ***Leptomelanosoma indicum***.

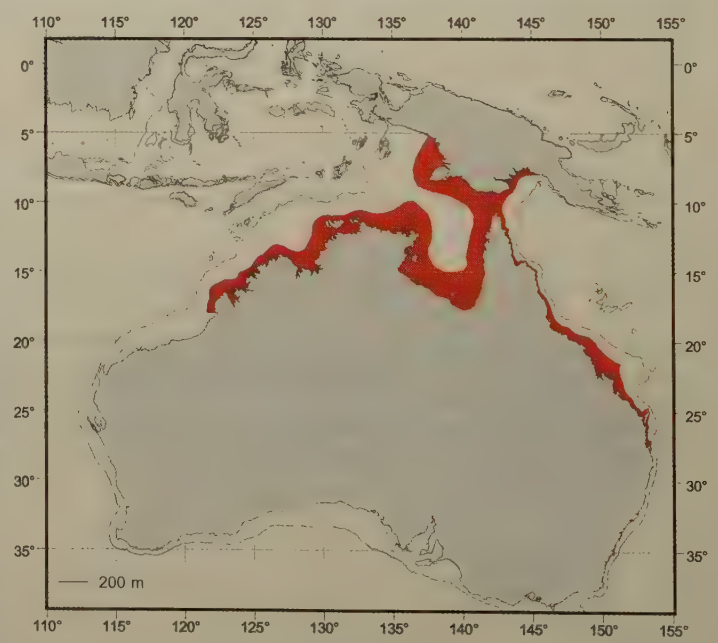



**Fig. 94** ***Polydactylus macrochir***
Known distribution

**Habitat and Biology:** Inhabits turbid coastal waters, estuaries and mangrove creeks as well as mangrove-lined rivers and is taken from depths of 0.2-6 m. Feeds mainly on crustaceans and fishes.

The species exhibits protandry. According to Kailola and Stewart *in* Kailola *et al.* (1993), individuals between 700 and 1 000 mm fork length may be transitional hermaphrodites. However, most less than 800 mm fork length are males and most more than 950 mm fork length are females. In the Gulf of Carpentaria and along the northeastern Queensland coastline, Australia, transitional ***P. macrochir*** are found in the months from June to September. In north Australian waters, it is known to spawn over the summer months from October to February or March, with a peak during December.

**Size:** Although ***P. macrochir*** was stated to reach a weight of about 45 kg (Macleay, 1884), such examples are not seen today (Marshall, 1964). Kailola and Stewart *in* Kailola *et al.* (1993), recorded the species at 140 cm fork length and 32 kg in the Gulf of Carpentaria, and more than 150 cm fork length in Princess Charlotte Bay. Validated ageing studies indicated that the species can live for more than 20 years, with an estimated maximum attainable size of 170 cm fork length and more than 40 kg (Kailola and Stewart *in* Kailola *et al.*, 1993).

**Interest to Fisheries:** ***P. macrochir*** is one of the most important species in the fisheries at Northern Territory, Queensland and Western Australia. The species is caught mainly by coastal set gillnets, but also by fixed tidal traps, beach seines, ring nets and handlines. In the southern Gulf of Carpentaria, Australia, the fishery for the species is largely based on male 3- to 6-year-old fish (Kailola and Stewart *in* Kailola *et al.*, 1993). From the Gulf of Carpentaria gillnet fishery between 1980 and 1987, the species averaged 30% by weight of total landings (Kailola and Stewart *in* Kailola *et al.*, 1993). It is also an important sport fish in northern Australian waters. They are caught with rod and reel or handlines, from shore or boat.

**Local Names:** AUSTRALIA: Burnett salmon, Gold threadfin, King salmon, King threadfin, Sheridan's threadfin; PAPUA NEW GUINEA: Longfinned threadfin.

**Literature:** Motomura *et al.* (2000); Motomura (2002).

**Remarks:** ***Polydactylus sheridani*** has been regarded as a valid species (e.g. Marshall, 1964; Munro, 1967; Menon, 1974; Grant, 1982). However, the characters of ***P. sheridani***, which includes maxilla large, posterior margin of maxilla extending beyond posterior margin of eye and second spine of first dorsal fin very strong, as described by Macleay (1884), were found to be consistent with those of the holotype of ***P. macrochir***. Comparison of a range of material with the latter and the original description of ***P. sheridani***, led to the conclusion that ***P. macrochir*** was a senior synonym of ***P. sheridani*** (see Motomura *et al.*, 2000).

***Polydactylus macrochir*** and 4 other Indo-West Pacific species included in this genus: ***P. bifurcus***, ***P. microstomus***, ***P. plebeius*** and ***P. siamensis***, are characterized by 5 pectoral filaments. ***Polydactylus macrochir*** can be easily distinguished from the 4 species by the posterior margin of the maxilla extending considerably beyond the level of the posterior margin of the adipose eyelid (slightly short of, reaching to, or extending slightly beyond in the other 4 species).

***Polydactylus macrochir*** further differs from ***P. microstomus*** in lacking a large black spot anteriorly on the lateral line (present in the latter). In overall body appearance, ***P. macrochir*** is similar to ***P. bifurcus***, ***P. plebeius*** and ***P. siamensis***. However, ***P. macrochir*** differs from ***P. bifurcus*** in having higher counts of gillrakers [32 to 35 (mode 34) versus 30 in the latter] and a simple lateral line (bifurcated in ***P. bifurcus***). ***Polydactylus macrochir*** is distinguished from ***P. plebeius*** and ***P. siamensis*** by having higher counts of pored lateral-line scales [70 to 76 (mode 72) versus 60 to 68 (mode 63) in ***P. plebeius*** and 54 to 58 (mode 54) in ***P. siamensis***], higher counts of gillrakers [32 to 35 (mode 34) versus 24 to 32 (mode 26) in ***P. plebeius*** and 22 to 24 (mode 23) in ***P. siamensis***], occipital profile concave in adults (nearly straight throughout life in ***P. plebeius*** and ***P. siamensis***), and the second spine of the first dorsal fin more robust than the other spines of the first dorsal fin (all spines similar in ***P. plebeius*** and ***P. siamensis***).

## ***Polydactylus macrophthalmus*** (Bleeker, 1858)

**Figs 95-96; Plate IIIb**

***Polynemus macrophthalmus*** Bleeker, 1858b: 10 [type locality: Palembang, Musi River, Sumatra, Indonesia; lectotype (RMNH 6015, 129 mm standard length) designated by Motomura *et al.*, 2001c; paralectotype (RMNH 33967, 117 mm standard length); date of publication of original description determined by Motomura *et al.*, 2001c].

**Synonyms:** None.

**FAO Names: En** - River threadfin; **Fr** - Barbure de rivière; **Sp** - Barbudo de rio.

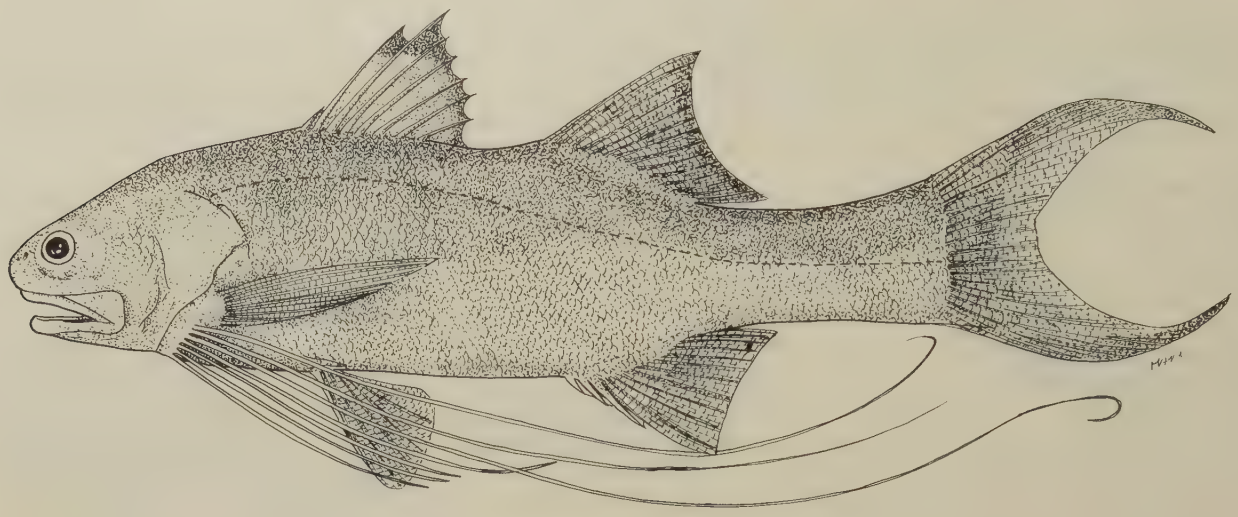


**Fig. 95** ***Polydactylus macrophthalmus*** **(adult)**

**Fig. 96** ***Polydactylus macrophthalmus*** **(juvenile)**

**Diagnostic Features:** A medium- to large-sized species. Body depth at first dorsal-fin origin 22 to 28% (mean 25%) of standard length; head length 29 to 33% (mean 31%) of standard length. Snout pointed; occipital profile nearly straight in young but concave in adults. Posterior margin of maxilla extending well beyond level of posterior margin of adipose eyelid; upper-jaw length 13 to 15% (mean 14%) of standard length; depth of posterior margin of maxilla approximately equal to or less than eye diameter; lip on lower jaw well developed, dentary teeth restricted to dorsal surface; teeth villiform in broad bands on vomer, palatines and ectopterygoids. Posterior margin of preopercle serrated. First dorsal fin with VIII spines, second spine more robust than others; second dorsal fin with I spine and 13 or 14 (mode 14) soft rays; anal fin with III spines and 10 or 11 (mode 11) soft rays, anal-fin base less than second dorsal-fin base; pectoral fin with 13 or 14 (mode 14) rays (all rays unbranched), its length 24 to 26% (mean 24%) of standard length, posterior tip not reaching to level of posterior tip of pelvic fin; pectoral filaments 7, upper 3 filaments extending beyond caudal-fin base; first to third pectoral filaments not reaching to level of posterior tip of pelvic fin; fourth pectoral filament extending slightly beyond anal-fin origin; fifth pectoral filament longest, its length 161 to 192% (mean 176%) of standard length, extending beyond posterior tips of caudal-fin lobes; caudal fin deeply forked, upper and lower caudal-fin lobes not filamentous, upper caudal-fin lobe 38 to 46% (mean 42%) and lower lobe 36 to 40% (mean 38%) of standard length. Pored lateral-line scales 87 to 94 (mode 88); lateral line simple, extending from upper end of gill opening to upper end of lower caudal-fin lobe; scale rows above lateral line 10 to 12 (mode 11), below 15 or 16 (mode 16). Gillrakers 10 to 12 (mode 11) on upper limb, 15 to 17 (mode 16) on lower limb, 25 to 29 (mode 27) total. Vertebrae 10 precaudal and 14 caudal; supraneural bones 3. Swimbladder present, well developed. **Colour:** Upper sides of head and trunk tinged silvery blue, becoming more silver on lower sides; posterior margins of first dorsal, second dorsal and caudal fins greyish black, other parts hyaline; tips of pelvic and anal fins white, other parts transparent; pectoral fin hyaline; pectoral filaments white.

**Geographical Distribution:** Currently known only from 3 rivers on 2 Indonesian islands: Kapuas River, Kalimantan, and Musi and Batanghari Rivers, Sumatra (Fig. 97). These rivers were part of a single large river, the ancient Central or North Sunda River, on the Sundaland during the Pleistocene, the last cold period being about 12 000 years ago (see Morley and Flenley *in* Whitmore, 1987: fig. 5.5; Motomura *et al.*, 2001c: fig. 3). Geographical evidence indicates that the species was well adapted to the fresh-water basins in this extensive Pleistocene River, whereas other ***Polydactylus*** species are generally found in salt water habitats. The Sundaland presently being submerged to a depth of about 100 m, ***P. macrophthalmus*** is now restricted to the 3 presently-known localities in the South China Sea.

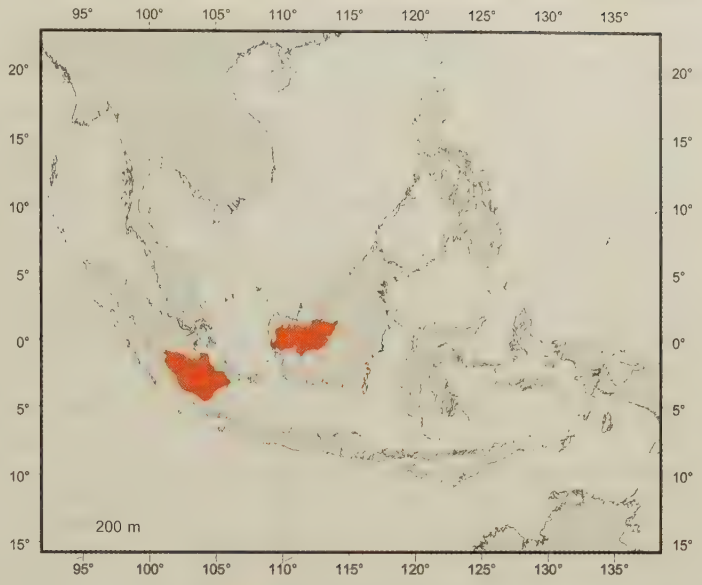



**Fig. 97** ***Polydactylus macrophthalmus***
Known distribution

**Habitat and Biology:** ***P. macrophthalmus*** has much longer pectoral filaments and a more slender body than other ***Polydactylus*** species, which generally inhabit marine waters. Such morphological characters are considered as an adaptation to a fresh-water existence, owing to their occurrence in ***Polynemus*** species restricted to fresh-water and/or estuarine habitats. The character of the long pectoral filaments is probably useful as a sense organ to search for food in muddy waters. Furthermore, they had been collected from Jambi and Palembang, located about 75 km up the Batanghari and Musi rivers, respectively (i.e. completely fresh-water basins). Accordingly, ***P. macrophthalmus*** is considered to be more heavily dependent upon a fresh-water habitat than other congeners.

**Size:** Maximum standard length at least 52 cm (Feltes *in* Carpenter and Niem, 2001).

**Interest to Fisheries:** Esteemed as a food fish at least along the Kapuas River, Kalimantan, Indonesia. The species has been often exported to Japan as an aquarium fish.

**Local Names:** None known.

**Literature:** Motomura *et al.* (2001c); Motomura (2002).

**Remarks:** ***P. macrophthalmus*** has long been treated as a member of ***Polynemus*** since its original description (e.g. Weber and de Beaufort, 1922; Myers, 1936; Roberts, 1989; Kottelat *et al.*, 1993). However, the species differs from ***Polynemus*** species in having the pectoral-fin insertion well below the midline on the lateral body (versus near midline), a basisphenoid present (versus absent) and 24 vertebrae (versus 25), and clearly conform to the following diagnostic characters of ***Polydactylus***: tooth plate on vomer simple; width of tooth band on upper and lower jaws wider than space separating tooth bands on opposing premaxilla; basisphenoid in contact with prootic; pectoral-fin base including base of pectoral filaments less than upper-jaw length; swimbladder simple, not extending beyond anal-fin origin. Accordingly, the species was included in the genus ***Polydactylus*** by Motomura *et al.* (2001c).

***Polydactylus macrophthalmus*** can be easily distinguished from other congeners (except ***P. longipes***) by the very long upper 3 pectoral filaments, extending beyond the caudal-fin base (not reaching caudal-fin base in the latter). ***Polydactylus macrophthalmus*** is similar to ***P. longipes*** in having long pectoral filaments, but the former differs from the latter in having 7 pectoral filaments (6 in the latter). Further comparisons of ***P. macrophthalmus*** with ***P. longipes*** are given in the account of the latter.

The Indo-Pacific ***Polydactylus*** with 7 pectoral filaments includes only 3 species: ***P. macrophthalmus***, ***P. multiradiatus*** and ***P. mullani***. In addition to the difference in pectoral-filament length, ***P. macrophthalmus*** differs from ***P. multiradiatus*** in having lower anal-fin ray counts [10 or 11 (mode 11) versus 16 to 18 (mode 16) in the latter], higher pored lateral-line scale counts [87 to 94 (mode 88) versus 49 to 56 (mode 52) in ***P. multiradiatus***] and a concave occipital profile in adults (nearly straight in ***P. multiradiatus***). Furthermore, ***P. macrophthalmus*** is clearly distinguished from ***P. mullani*** by the higher counts of pored lateral-line scales, and scales above and below the lateral line [87 to 94 (mode 88) and 10 to 12 (mode 11) / 15 or 16 (mode 16), respectively versus 46 to 50 (mode 48) and 5 to 7 (mode 6) / 9 or 10 (mode 10), respectively, in the latter], lower gill-raker counts [25 or 29 (mode 27) versus 31 to 35 (mode 32) in ***P. mullani***], a concave occipital profile in adults (nearly straight in ***P. mullani***), vomerine tooth present (absent), unbranched pectoral-fin rays (branched except uppermost 1 or 2 rays in ***P. mullani***), and a large black spot absent anteriorly on the lateral line (present in ***P. mullani***).

***Polydactylus macrophthalmus*** is similar to ***P. macrochir*** in having a concave occipital profile in adults and the second spine of the first dorsal fin more robust than other spines of the first dorsal fin. However, ***P. macrophthalmus*** differs from the latter in having higher counts of pectoral filaments (7 versus 5 in the latter) and pored lateral-line scales [87 to 94 (mode 88) versus 70 to 76 (mode 72) in ***P. macrochir***], and lower gill-raker counts [25 to 29 (mode 27) versus 32 to 35 (mode 34) in ***P. macrochir***].

## *Polydactylus malagasyensis* Motomura and Iwatsuki, 2001

**Fig. 98; Plate IIIc**

*Polydactylus malagasyensis* Motomura and Iwatsuki, 2001b: 338, figs. 1, 7a, 8a [type locality: estuary of Mananjary River (about 100 m from sea), Mananjary, eastern Madagascar; holotype (AMNH 88029, 125 mm standard length); 35 paratypes (AMNH 231222, 3 specimens, 95 to 141 mm standard length; AMS I. 28114009, 2 specimens, 102 to 104 mm standard length; ANSP 54807, 59 mm standard length; ANSP 77390, 127 mm standard length; ANSP 86372, 2 specimens, 94 to 136 mm standard length; CAS 66577, 3 specimens, 99 to 117 mm standard length; CAS 131390, 2 specimens, 144 to 148 mm standard length; MUFS 20381, 104 mm standard length; NRM 10479, 3 specimens, 135 to 149 mm standard length; NRM 10480, 4 specimens, 74 to 87 mm standard length; USNM 171045, 126 mm standard length; USNM 278209, 113 mm standard length; USNM 301505, 125 mm standard length; USNM 307631, 129 mm standard length; USNM 358684, 3 specimens, 124 to 139 mm standard length; USNM 363484, 3 specimens, 63 to 126 mm standard length; SAM 34057, 3 specimens, 121 to 134 mm standard length)].

**Synonyms:** None.

**FAO Names: En** - African blackspot threadfin; **Fr** - Barbure tâche noire d'Afrique; **Sp** - Barbudo mancha negra africano.

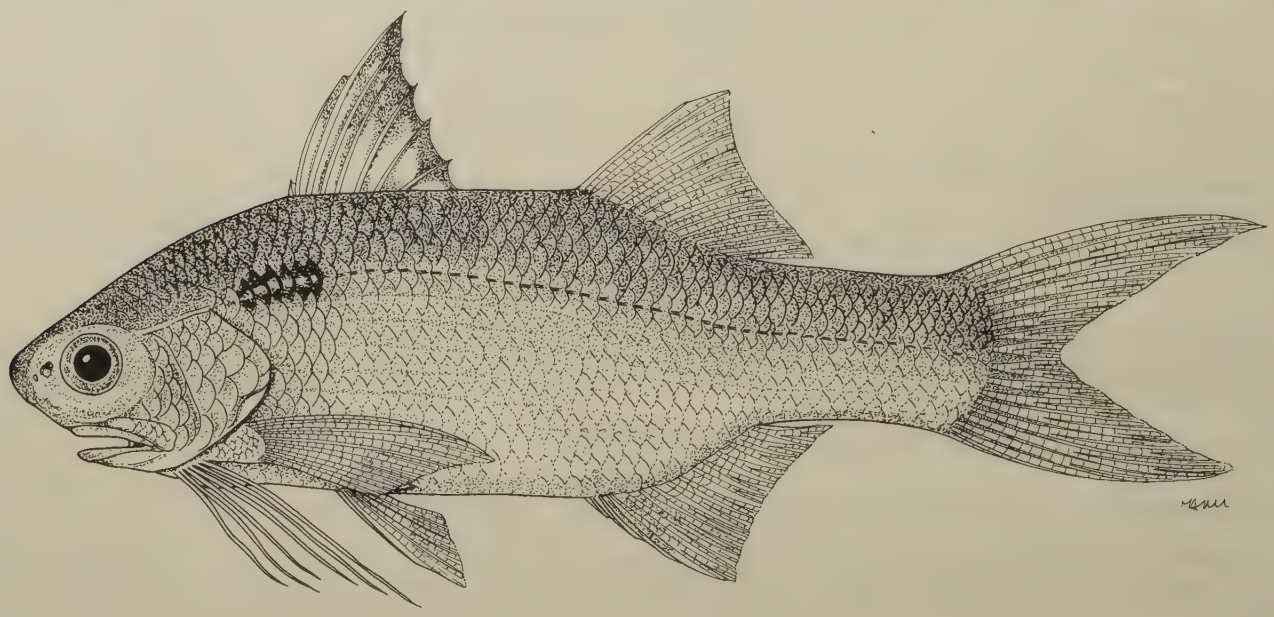


**Fig. 98** ***Polydactylus malagasyensis***

**Diagnostic Features:** A small- to medium-sized species. Body depth at first dorsal-fin origin 31 to 35% (mean 34%) of standard length; head length 31 to 35% (mean 33%) of standard length. Snout pointed; occipital profile nearly straight. Posterior margin of maxilla extending slightly beyond or reaching to level of posterior margin of adipose eyelid; upper-jaw length 13 to 14% (mean 13%) of standard length; depth of posterior margin of maxilla less than eye diameter; lip on lower jaw well developed, dentary teeth restricted to dorsal surface; teeth villiform in broad bands on palatines and ectopterygoids; vomerine tooth plate covered with skin and teeth absent; palatines inwardly turned anteriorly. Posterior margin of preopercle serrated. First dorsal fin with VIII spines, second spine slightly more robust than or similar to others; second dorsal fin with I spine and 12 or 13 (mode 13) soft rays; anal fin with III spines and 12 soft rays, anal-fin base approximately equal to or greater than second dorsal-fin base; pectoral fin with 14 rays (all rays unbranched, except uppermost 1 or 2), its length 21 to 26% (mean 24%) of standard length, posterior tip not reaching to level of posterior tip of pelvic fin; pectoral filaments 6, first filament shortest, reaching to level of pelvic-fin origin; second to fifth pectoral filaments extending slightly beyond level of pelvic-fin origin; sixth pectoral filament longest, its length 27 to 31% (mean 29%) of standard length, just short of or extending slightly beyond level of posterior tip of pectoral fin; caudal fin deeply forked, upper and lower caudal-fin lobes not filamentous, upper caudal-fin lobe 35 to 40% (mean 39%) and lower lobe 34 to 38% (mean 36%) of standard length. Pored lateral-line scales 46 to 51 (mode 47); lateral line simple, extending from upper end of gill opening to upper end of lower caudal-fin lobe; scale rows above lateral line 5 or 6 (mode 6), below 9 or 10 (mode 10). Gillrakers 12 to 16 (mode 13) on upper limb, 17 to 19 (mode 18) on lower limb, 29 to 34 (mode 31) total. Vertebrae 10 precaudal and 14 caudal; supraneural bones 3. Swimbladder present, well developed. **Colour:** Golden olive above, but mainly silvery; a large black spot present anteriorly on lateral line.

**Geographical Distribution:** Currently known only from Kenya, Mozambique, South Africa and Madagascar (Fig. 99). It is likely to be distributed over a wider area, including United Republic of Tanzania and Somalia, east coast of Africa.

**Habitat and Biology:** Taken both in estuaries (less 5.5 m) and offshore (16 to 62 m). No other data available.

**Size:** Maximum standard length at least 15 cm (Motomura and Iwatsuki, 2001b).

**Interest to Fisheries:** None.

**Local Names:** MOZAMBIQUE: Barudo de mancha; UNITED REPUBLIC OF TANZANIA: Kupe, Mkizi komo maji; SOUTH AFRICA: Sesvinger-draadvin, Sixfinger threadfin.

**Literature:** Motomura and Iwatsuki (2001b); Motomura (2002).

**Remarks:** ***P. malagasyensis***, previously identified as ***P. sextarius*** (e.g. Smith *in* Smith and Heemstra, 1986; Menon and Babu Rao *in* Fischer and Bianchi, 1984), was recently described as a new species on the basis of 36 specimens (Motomura and Iwatsuki, 2001b).

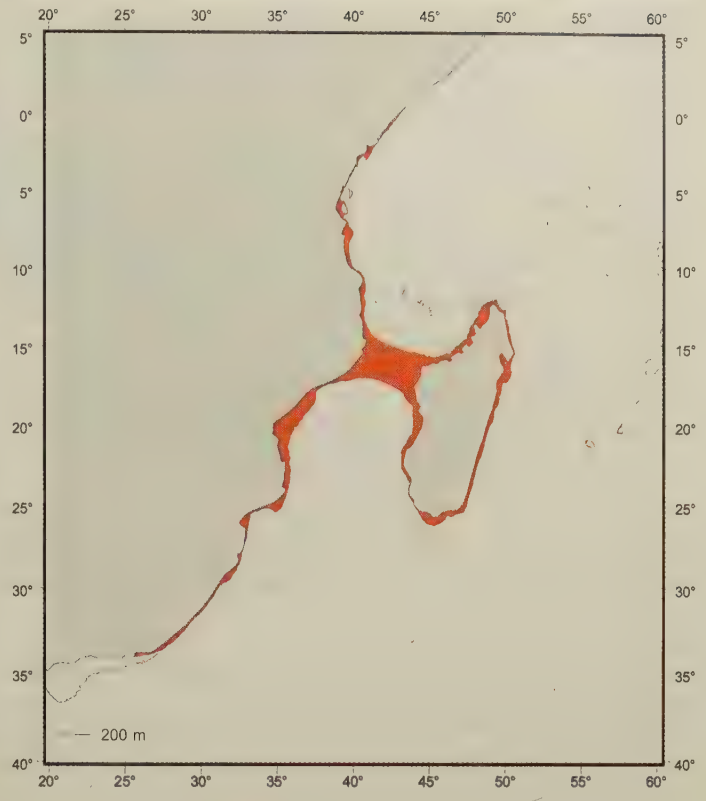



**Fig. 99** ***Polydactylus malagasyensis***
Known distribution

Five ***Polydactylus*** species: ***P. malagasyensis***, ***P. microstomus***, ***P. mullani***, ***P. persicus*** and ***P. sextarius***, are characterized by having all pectoral-fin rays branched, except the uppermost 1 or 2, the vomer without teeth and a large black spot anteriorly on the lateral line. Characters of the pectoral fin and coloration of this group are unique among the family Polynemidae. In addition to the group, only a single species, ***P. nigripinnis***, has the vomer without teeth in the genus.

***Polydactylus malagasyensis*** is similar to other 4 species in overall body appearance. However, the species can be easily distinguished from ***P. microstomus*** and ***P. mullani*** by the number of pectoral filaments [6 versus 5 (rarely asymmetrically 5 and 6) and 7 (rarely asymmetrically 6 and 7), respectively, in the latter].

The 3 species, with 6 pectoral filaments: ***P. malagasyensis***, ***P. persicus*** and ***P. sextarius***, have been considered as conspecific (e.g. Menon *in* Fischer and Whitehead, 1974; Menon and Babu Rao *in* Fischer and Bianchi, 1984). However, ***P. malagasyensis*** differs from ***P. sextarius*** in having a well-developed swimbladder (length about 40 to 45% of standard length versus an atrophied, string-like swimbladder, about 20% of standard length in the latter; see Motomura and Iwatsuki, 2001b: fig. 7), higher counts of gillrakers [29 to 34 (mode 31) versus 25 to 30 (mode 28) in ***P. sextarius***]. Furthermore, the second dorsal-fin spine length in ***P. malagasyensis*** [7 to 9% (mean 7%) of standard length] is significantly longer than that of ***P. sextarius*** [5 to 8% (mean 6%) of standard length].

***Polydactylus malagasyensis*** differs from ***P. persicus*** in having higher counts of pectoral-fin rays [14 versus 12 to 14 (mode 12) in the latter] and scales below the lateral line [9 or 10 (mode 10) versus 8 or 9 (mode 9) in ***P. persicus***], in addition to the palatine being inwardly turned anteriorly (straight in ***P. persicus***; see Motomura and Iwatsuki, 2001b: fig. 8). Whereas the posterior tip of the uppermost pectoral filament of ***P. malagasyensis*** extends slightly beyond or does not reach to the posterior tip of the pectoral fin, that of ***P. persicus*** extends well beyond the latter, owing to ***P. malagasyensis*** having both a longer pectoral fin [21 to 26% (mean 24%) of standard length versus 18 to 20% (mean 19%) of standard length in ***P. persicus***] and shorter pectoral filaments [27 to 31% (mean 29%) of standard length versus 26 to 36% (mean 32%) of standard length in ***P. persicus***]. Furthermore, the pectoral-fin base length, including the pectoral-filament base, of ***P. malagasyensis*** [10 to 12% (mean 12%) of standard length] is significantly greater than that of ***P. persicus*** [10 to 11% (mean 10%) of standard length].

## ***Polydactylus microstomus*** (Bleeker, 1851)

**Fig. 100; Plate IIId**

***Polynemus microstoma*** Bleeker, 1851b: 217 [type locality: Bulukumba, Sulawesi, Indonesia; holotype (RMNH 6044, 53 mm standard length) determined from 9 Bleeker specimens by Motomura and Iwatsuki, 2001b].

**Synonyms:** ***Polydactylus zophomus*** Jordan and McGregor *in* Jordan and Seale, 1907: 11, fig. 4 [type locality: Cavite, Luzon Island, Philippines; holotype (CAS 120113, 138 mm standard length) determined by Motomura and Iwatsuki, 2001b; paratype (USNM 55598, 2 specimens including a paratype and a non-type, 137 to 151 mm standard length)].

**FAO Names: En** - Smallmouth threadfin; **Fr** - Barbure à petite bouche; **Sp** - Barbudo de boca pequeña.

**Fig. 100** ***Polydactylus microstomus***

**Diagnostic Features:** A small- to medium-sized species. Body depth at first dorsal-fin origin 26 to 36% (mean 32%) of standard length; head length 29 to 36% (mean 33%) of standard length. Snout pointed; occipital profile nearly straight. Posterior margin of maxilla reaching to or slightly short of level of posterior margin of adipose eyelid; upper-jaw length 12 to 14% (mean 13%) of standard length; depth of posterior margin of maxilla less than eye diameter; lip on lower jaw well developed, dentary teeth restricted to dorsal surface; teeth villiform in broad bands on palatines and ectopterygoids; vomerine tooth plate covered with skin and teeth absent; palatines inwardly turned anteriorly. Posterior margin of preopercle serrated. First dorsal fin with VIII spines, second spine slightly more robust than or similar to others; second dorsal fin with I spine and 12 to 14 (mode 13) soft rays; anal fin with III spines and 11 or 12 (mode 12) soft rays, anal-fin base approximately equal to or less than second dorsal-fin base; pectoral fin with 13 or 14 (mode 13, rarely 12 or 15) rays (all rays unbranched, except uppermost 1 or 2), its length 17 to 20% (mean 18%) of standard length, posterior tip not reaching to level of posterior tip of pelvic fin; pectoral filaments 5, first filament shortest, not reaching to or just reaching to level of pelvic-fin origin; second to fourth pectoral filaments just short of or extending slightly beyond level of pelvic-fin origin; fifth pectoral filament longest, its length 21 to 30% (mean 26%) of standard length, just short of or extending slightly beyond level of posterior tip of pectoral fin; caudal fin deeply forked, upper and lower caudal-fin lobes not filamentous, upper caudal-fin lobe 31 to 41% (mean 36%) and lower lobe 31 to 39% (mean 35%) of standard length. Pored lateral-line scales 46 to 49 (mode 47); lateral line simple, extending from upper end of gill opening to upper end of lower caudal-fin lobe; scale rows above lateral line 6 or 7 (mode 6), below 9 or 10 (mode 10, rarely 8). Gillrakers 10 to 14 (mode 13) on upper limb, 13 to 18 (mode 16) on lower limb, 24 to 33 (mode 29) total. Vertebrae 10 precaudal and 14 caudal; supraneural bones 3. Swimbladder present, well developed. **Colour:** Head and upper sides of trunk tinged yellowish silver, becoming lighter silver on lower sides; snout semi-translucent; posterior margins of first and second dorsal fins and caudal fin slightly blackish, remaining parts translucent yellowish white; pectoral fin membrane yellowish; pectoral filaments faintly white; anterior margins and origins of pelvic and anal fins faintly white, remaining parts yellow; a large black spot anteriorly on lateral line.

**Geographical Distribution:** Currently known from the Indian Ocean, where it ranges from Tamil Nadu, east of the southernmost tip of India, Sri Lanka, Myanmar and Phuket Island, Thailand, to the West Pacific where it ranges from Taiwan Province of China to New Caledonia, being relatively common in the eastern part of Indonesia and Philippines (Fig. 101). However, examples of ***P. microstomus*** have at no time (apparently) been collected from Australian waters.

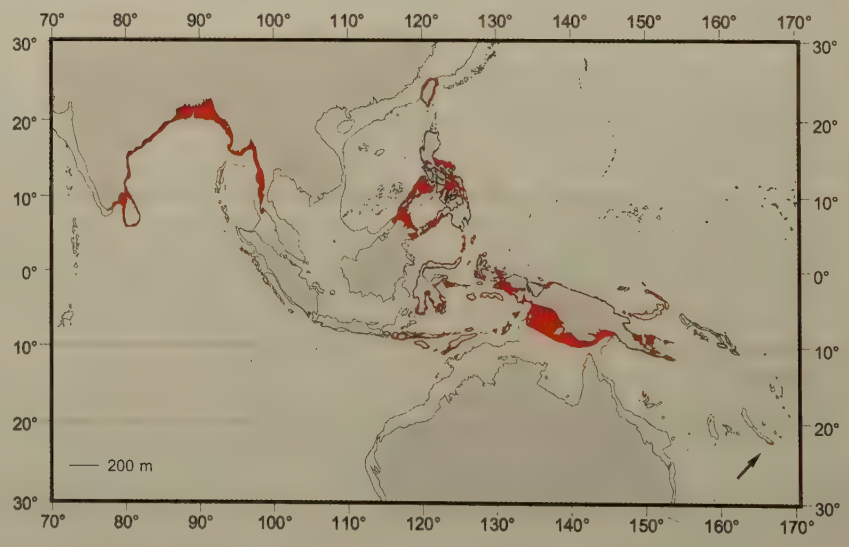



**Fig. 101** ***Polydactylus microstomus***
Known distribution

**Habitat and Biology:** Inhabits turbid coastal waters, estuaries and mangrove creeks, as well as mangrove-lined rivers. Most of the species are taken from depths of less than 2 m. However, Schroeder (1980) reported the species in depths of less than 20 m in the Philippines. Furthermore, a specimen (USNM 300898, 132 mm standard length) from Myanmar was purportedly collected from a depth of 55 m.

**Size:** Maximum standard length at least 16 cm (Motomura and Iwatsuki, 2001b).

**Interest to Fisheries:** None.

**Local Names:** PHILIPPINES: Akin-akin, Kuwa-kuwa, Mamaling babai, Mamaling bato; PAPUA NEW GUINEA: Small-mouthed threadfin.

**Literature:** Motomura and Iwatsuki (2001b); Motomura (2002).

**Remarks:** ***P. zophomus***, originally described from Cavite, Luzon Island, Philippines, has been frequently regarded as a valid species (Jordan and Richardson, 1908; Seale, 1910), although type specimens of the species have apparently never been compared directly with those of ***P. microstomus***. Examination of the types of both species showed that they represented a single species (Motomura and Iwatsuki, 2001b). Therefore, ***P. zophomus*** is a junior synonym of ***P. microstomus***.

Günther (1860) described 2 specimens with 5 pectoral filaments and a black blotch on the lateral line near its origin as ***Polynemus plebejus***, but the specimens are clearly ***Polydactylus microstomus***. The species name, ***microstoma***, given by Bleeker (1851b), is changed to ***microstomus*** in accordance with the masculine gender of the genus name.

***Polydactylus microstomus*** and 4 ***Polydactylus*** species: ***P. malagasyensis***, ***P. mullani***, ***P. persicus*** and ***P. sextarius***, are characterized by having all pectoral-fin rays branched, except the uppermost 1 or 2, the vomer without teeth and a large black spot anteriorly on the lateral line. The above 5 species are similar to each other in overall body appearance. However, ***P. microstomus*** can be easily distinguished from the other 4 species by the number of pectoral filaments [5 (rarely asymmetrically 5 and 6) versus 7 (rarely asymmetrically 6 and 7) in ***P. mullani*** and 6 in the remaining 3 species].

## ***Polydactylus mullani*** (Hora, 1926)

**Fig. 102; Plate IIIe**

***Polynemus sextarius mullani*** Hora, 1926: 453 [type locality: Mumbai, India; holotype (ZSI-F 10747, 157 mm standard length); 3 paratypes (ZSI-F 10748, 106 mm standard length; ZSI-F 10749, 97 mm standard length; ZSI-F 10750, 92 mm standard length) reregistered by Motomura and Iwatsuki, 2001b].

**Synonyms:** None.

**FAO Names: En** - Arabian blackspot threadfin; **Fr** - Barbure à tâche noire d'Arabie; **Sp** - Barbudo de mancha negra árabe.

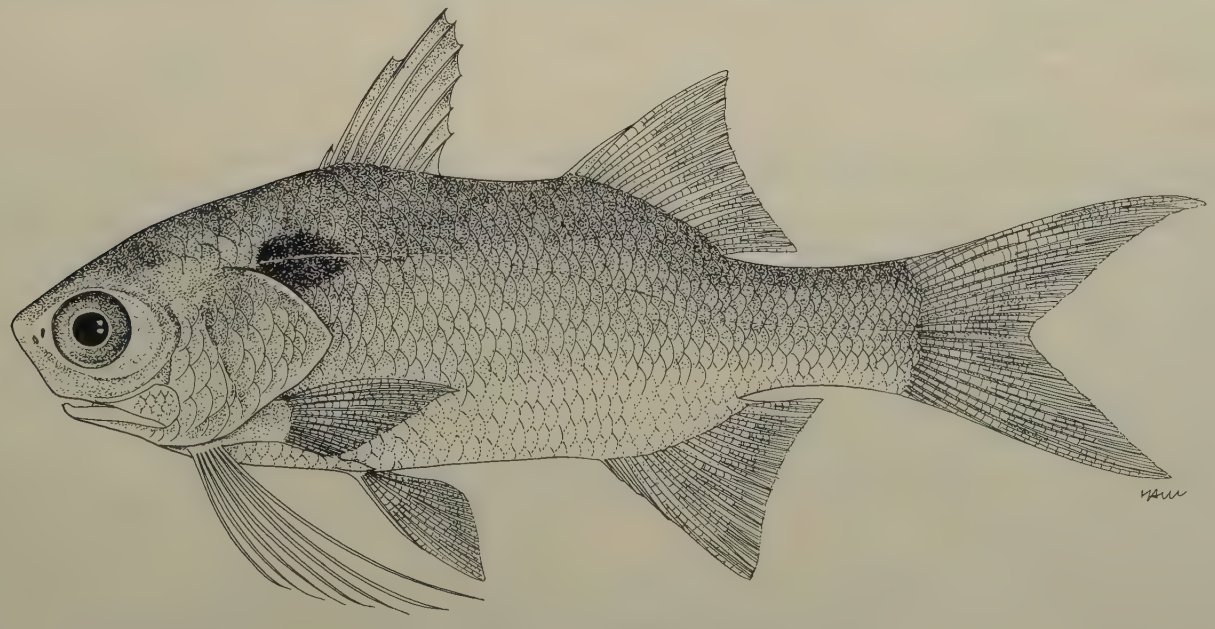


**Fig. 102** ***Polydactylus mullani***

**Diagnostic Features:** A small- to medium-sized species. Body depth at first dorsal-fin origin 28 to 35% (mean 33%) of standard length; head length 33 to 37% (mean 35%) of standard length. Snout pointed; occipital profile nearly straight. Posterior margin of maxilla just reaching to or not reaching to (in adults over about 60 mm standard length), or extending well beyond (in young) level of posterior margin of adipose eyelid; upper-jaw length 14 to 17% (mean 15%) of standard length; depth of posterior margin of maxilla less than eye diameter; lip on lower jaw well developed, dentary teeth restricted to dorsal surface; teeth villiform in broad bands on palatines and ectopterygoids; vomerine tooth plate covered with skin and teeth absent; palatines inwardly turned anteriorly. Posterior margin of preopercle serrated. First dorsal fin with VIII spines, second spine more robust than others; second dorsal fin with I spine and 12 or 13 (mode 13) soft rays; anal fin with III spines and 11 or 12 (mode 12) soft rays, anal-fin base less than second dorsal-fin base; pectoral fin with 13 or 14 (mode 13) rays (all rays unbranched, except uppermost 1 or 2), its length 19 to 22% (mean 20%) of standard length, posterior tip not reaching to level of posterior tip of pelvic fin; pectoral filaments 7 (rarely asymmetrically 6 and 7); first (shortest) and second filaments, not reaching to level of pelvic-fin origin; third to sixth pectoral filaments extending beyond level of pelvic-fin origin; seventh pectoral filament longest, its length 28 to 45% (mean 33%) of standard length, extending well beyond level of posterior tip of pectoral fin and not reaching to (in adults over about 60 mm standard length) or reaching to (in young) level of anal-fin origin; caudal fin deeply forked, upper and lower caudal-fin lobes not filamentous, upper caudal-fin lobe 32 to 52% (mean 39%) and lower lobe 32 to 50% (mean 38%) of standard length. Pored lateral-line scales 46 to 50 (mode 48); lateral line simple, extending from upper end of gill opening to upper end of lower caudal-fin lobe; scale rows above lateral line 5 to 7 (mode 6), below 9 or 10 (mode 10). Gillrakers 13 to 16 (mode 14) on upper limb, 18 to 21 (mode 18) on lower limb, 31 to 35 (mode 32) total. Vertebrae 10 precaudal and 14 caudal; supraneural bones 3. Swimbladder present, well developed. **Colour:** Head and upper sides of trunk tinged darkly silver, becoming lighter silver on lower sides; snout semi-translucent; anterior and posterior margins of first and second dorsal, anal and caudal fins slightly blackish, other parts grey; pectoral-fin membrane grey with scattered melanophores; base of pectoral filaments white, becoming dark posteriorly; anterior margin and lower tip of pelvic fin grey, other parts white; a large black spot anteriorly on lateral line.

**Geographical Distribution:** Endemic and common in the northern Arabian Sea (Fig. 103).

**Habitat and Biology:** Taken from depths of 14 to 115 m. Hida (1967) examined 401 specimens of the species and determined their sexes: the hermaphrodites (231 specimens, 57.6% of total) range from 6.0 to 16.4 cm with a peak at 11.0 cm; the mature females with large granulated ova (144 specimens, 35.9% of total) range from 10.0 to 18.4 cm with a peak at 12.5 cm; and immature females (25 specimens, 6.2% of total) and presumed male (1 specimen, 0.3% of total) range from 9.0 to 15.9 cm without conspicuous peaks. ***Polydactylus mullani*** feeds mainly on shrimps and small fishes.

**Size:** Maximum standard length at least 19 cm (Motomura and Iwatsuki, 2001b).

**Interest to Fisheries:** One of the most important commercial species in the northern Arabian Sea. Caught by bottom trawls. Hida (1967) reported that 3 700 examples were caught in 1 haul off southern Kathiawar, India on 15 November 1963.

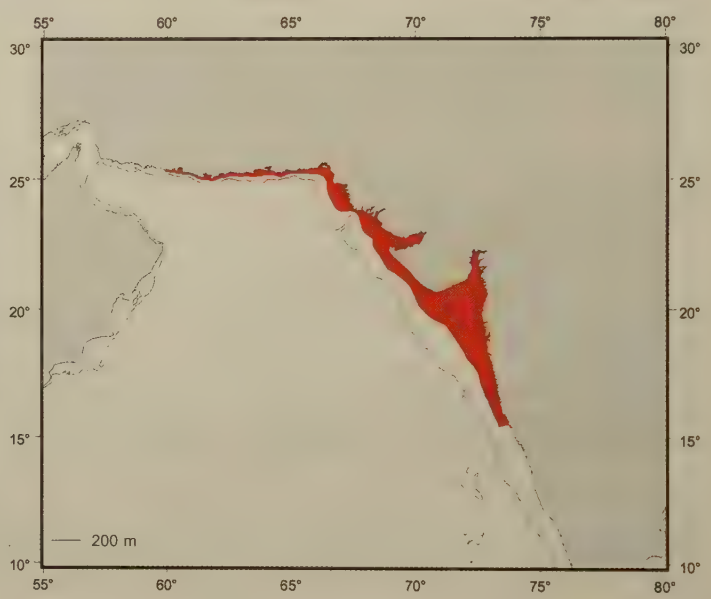



**Fig. 103** ***Polydactylus mullani***
Known distribution

**Local Names:** None known.

**Literature:** Motomura and Iwatsuki (2001b); Motomura (2002).

**Remarks:** Hora (1926) described ***Polynemus sextarius mullani*** as a new subspecies on the basis of 4 specimens (holotype and 3 paratypes). The subspecies was raised to specific status (as ***Polydactylus mullani***) by Motomura and Iwatsuki (2001b), because the species can be easily distinguished from other congeners, including ***P. sextarius***.

***Polydactylus mullani*** has been frequently misidentified as ***Filimanus heptadactyla*** (e.g. Kagwade, 1970, as ***Polynemus heptadactylus***; Talwar and Kacker, 1984, as ***Polydactylus heptadactylus***). However, ***P. mullani*** differs from the latter in having wider teeth bands on the upper and lower jaws (compared with the space separating the teeth bands on opposing premaxilla versus narrower teeth bands on the upper and lower jaws in ***F. heptadactyla***), the basisphenoid in contact with the prootic (not in contact in ***F. heptadactyla***), lower gill-raker counts [31 to 35 (mode 32) versus 35 to 41 (mode 39 in ***F. heptadactyla***)] and a large black spot present anteriorly on the lateral line (absent in ***F. heptadactyla***). Furthermore, whereas ***P. mullani*** is currently known only from the northern Arabian Sea in the Indian Ocean, ***F. heptadactyla*** is distributed in the western Pacific Ocean.

***Polydactylus mullani*** and 4 ***Polydactylus*** species: ***P. malagasyensis***, ***P. microstomus***, ***P. persicus*** and ***P. sextarius***, are characterized by having all pectoral-fin rays branched, except the uppermost 1 or 2, the vomer without teeth and a large black spot anteriorly on the lateral line. ***Polydactylus mullani*** can be easily distinguished from the other 4 species by the number of pectoral filaments [7 (rarely asymmetrically 6 and 7) versus 5 (rarely asymmetrically 5 and 6) in ***P. microstomus*** and 6 in the remaining 3 species].

The body appearance of ***P. mullani*** varies remarkably with overall fish growth, compared with that of the other 4 species with a large black anterior lateral-line spot. The uppermost pectoral filament and posterior margin of the maxilla in young specimens (less than about 60 mm standard length) of ***P. mullani*** reach (versus not reaching in adults) the anal-fin origin and extend well beyond (versus just reaching or not reaching) posterior margin of the adipose eyelid, respectively. Furthermore, the upper and lower caudal-fin lobes of young specimens (less than about 60 mm standard length) of ***P. mullani*** are extremely long [50 to 52% (mean 51%) of standard length and 43 to 50% (mean 47%) of standard length, respectively versus 32 to 42% (mean 38%) of standard length and 32 to 39% (mean 36%) of standard length, respectively, in adults]. These growth-related features are not found in the other 4 species.

## ***Polydactylus multiradiatus*** (Günther, 1860) **Fig. 104; Plate IIIf**

***Polynemus multiradiatus*** Günther, 1860: 324 [type locality: China (but probably erroneous, see Motomura, Johnson and Iwatsuki, 2002); holotype (BMNH 1852.5.4.5, stuffed specimen, 147 mm standard length)].

**Synonyms:** ***Polynemus specularis*** De Vis, 1883: 285 (type locality: Brisbane River, Queensland, Australia; 2 or more syntypes apparently lost, see Motomura, Johnson and Iwatsuki, 2002). ***Polydactylus auratus*** McKay, 1970: 8 [type locality: Napier Broome Bay, Western Australia, Australia; holotype (WAM-P 16792-001, 115 mm standard length); 3 paratypes (WAM-P 16793-001, 106 mm standard length; WAM-P 16794-001, 129 mm standard length; WAM-P 16795-001, 99 mm standard length)].

**FAO Names: En** - Australian threadfin; **Fr** - Barbure à dos sombre; **Sp** - Barbudo de lomo oscuro.

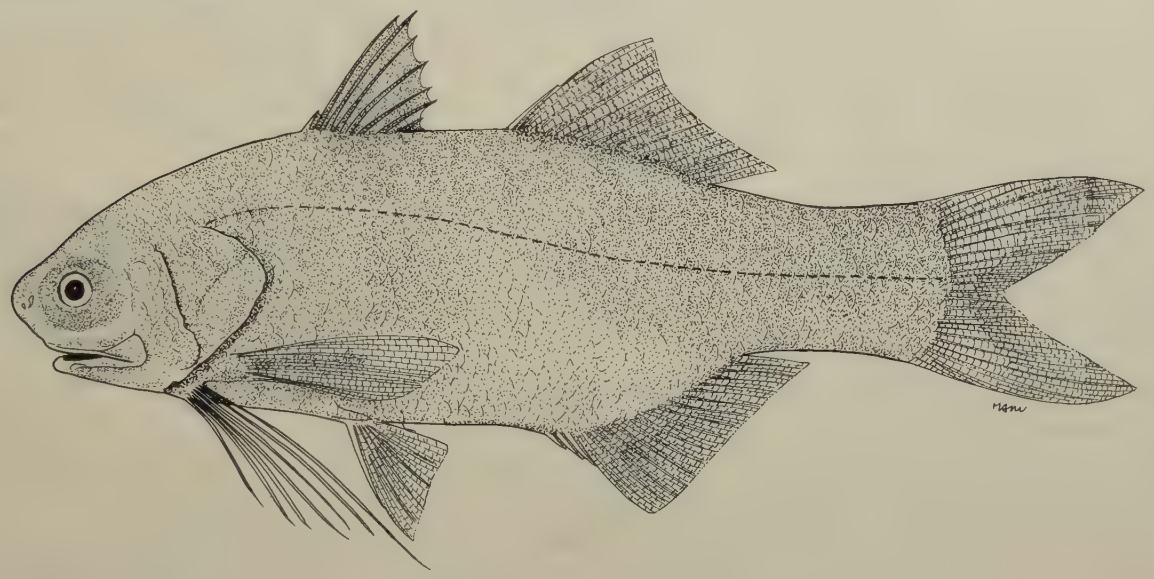


**Fig. 104** ***Polydactylus multiradiatus***

**Diagnostic Features:** A small- to medium-sized species. Body depth at first dorsal-fin origin 31 to 38% (mean 35%) of standard length; head length 28 to 33% (mean 30%) of standard length. Snout pointed; occipital profile nearly straight. Posterior margin of maxilla not reaching to, just reaching to or extending slightly beyond level of posterior margin of adipose eyelid; upper-jaw length 12 to 14% (mean 13%) of standard length; depth of posterior margin of maxilla less than eye diameter; lip on lower jaw well developed, dentary teeth restricted to dorsal surface; teeth villiform in broad bands on vomer, palatines and ectopterygoids. Posterior margin of preopercle serrated. First dorsal fin with VIII spines, all spine bases of similar thickness; second dorsal fin with I spine and 13 to 15 (mode 14) soft rays; anal fin with III spines and 16 to 18 (mode 16) soft rays, anal-fin base greater than second dorsal-fin base; pectoral fin with 14 to 17 (mode 15) rays (all rays unbranched), its length 25 to 30% (mean 28%) of standard length, posterior tip not reaching to level of posterior tip of pelvic fin; pectoral filaments 7 (rarely 6 on each side, asymmetrically 6 and 7, or 7 and 8); first (shortest) and second pectoral filaments not reaching to level of pelvic-fin origin; third pectoral filament reaching to or just short of level of pelvic-fin origin; fourth pectoral filament extending slightly beyond or reaching level of pelvic-fin origin; fifth and sixth (rarely longest) pectoral filaments extending well beyond level of pelvic-fin origin; seventh pectoral filament longest, its length 26 to 32% (mean 30%) of standard length, not extending to posterior tip of pectoral fin; caudal fin deeply forked, upper and lower caudal-fin lobes not filamentous, upper caudal-fin lobe 36 to 42% (mean 39%) and lower lobe 34 to 41% (mean 37%) of standard length. Pored lateral-line scales 49 to 56 (mode 52); lateral line simple, extending from upper end of gill opening to upper end of lower caudal-fin lobe; scale rows above lateral line 7 or 8 (mode 8), below 14 or 15 (mode 14). Gillrakers 11 to 14 (mode 12) on upper limb, 16 to 20 (mode 17) on lower limb, 27 to 33 (mode 30) total. Vertebrae 10 precaudal and 14 caudal; supraneural bones 3. Swimbladder absent. **Colour:** Upper sides of head and trunk with slightly darkish silver to bronze tinge, becoming

lighter silvery white on lower sides; snout semi-translucent with dusky tip; intensity of pigmentation of pectoral and upper part of first dorsal fin variable, but usually at least partially covered with dusky melanophores; posterior tip of second dorsal fin blackish, other parts pale fleshy yellow; pectoral filaments white; anterior margin of anal fin white, other parts dusky whitish to yellow; caudal fin semi-translucent greyish.

**Geographical Distribution:** Currently known only from southern Indonesia (Timor and Arafura Seas) and northern Australia (Northern Territory, Queensland, and northern Western Australia and New South Wales) (Fig. 105). Judging from presently known locality data for the species, the type locality (China), given by Günther (1860) is most likely erroneous.

**Habitat and Biology:** ***P. multiradiatus*** has a similar distribution to ***P. macrochir***, occurring in southern Papua New Guinea and northern Australia. However, collection data for ***P. macrochir*** indicated that specimens had been taken from depths of 0.2 to 6 m on muddy or sandy bottoms, whereas most specimens of ***P. multiradiatus*** (except a single young specimen, AMS IB. 3089, 103 mm standard length, collected from depth of 4 m), were taken from depths of 10 to 56 m, also on muddy or sandy bottoms. This suggests that ***P. macrochir*** and ***P. multiradiatus*** are segregated vertically, although fully overlapping geographically.

On the basis of gonad examinations, it is clear that ***P. multiradiatus*** is a protandrous hermaphrodite, changing sex from male to female between 120 and 140 mm standard length (Motomura, Johnson and Iwatsuki, 2002). The body depth of individuals also increased significantly during that period (Motomura, Johnson and Iwatsuki, 2002: fig. 2).

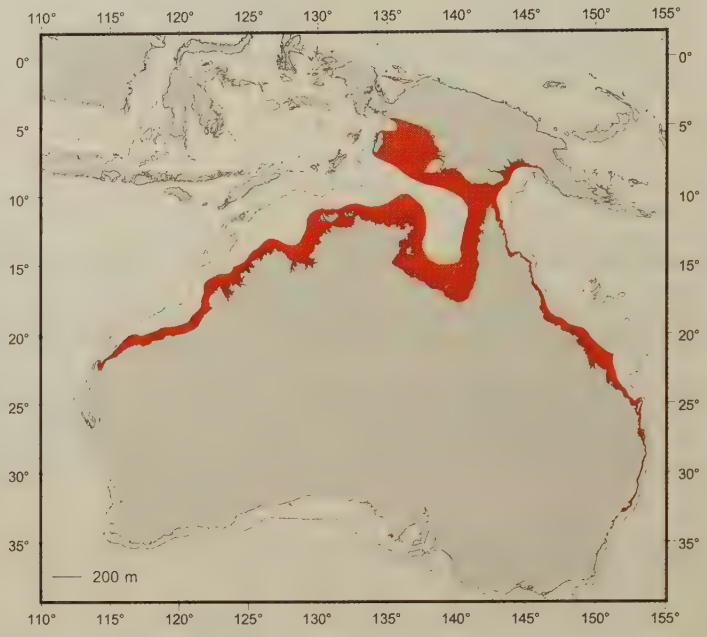



**Fig. 105** ***Polydactylus multiradiatus***
Known distribution

Sumpton and Greenwood (1990: table 1) listed the food items in the stomachs of juveniles (20 to 59 mm fork length) of ***P. multiradiatus*** from the Logan-Albert estuarine system, Moreton Bay, Queensland, Australia. Smaller individuals of the species (20 to 29 mm fork length) fed predominantly on calanoid copepods, which formed 83% by volume of their diet. With progressive increases in the size of the species, copepods became a less important dietary item, comprising only 28% of the average stomach volume at a size of 50 to 59 mm fork length.

**Size:** Maximum standard length at least 15 cm (Motomura, Johnson and Iwatsuki, 2002).

**Interest to Fisheries:** None.

**Local Names:** AUSTRALIA: Günther's threadfin; PAPUÀ NEW GUINEA: Many-rayed threadfin.

**Literature:** Motomura, Johnson and Iwatsuki (2002b); Motomura (2002).

**Remarks:** ***Polynemus specularis*** was briefly described by De Vis (1883) on the basis of 2 or more specimens from the Brisbane River, Queensland, Australia. De Vis (1883) stated that the anal-fin soft rays of the species numbered 17 or 18, which is consistent with ***Polydactylus multiradiatus*** (16 to 18), and different from the usual condition (10 to 13) among other Indo-Pacific ***Polydactylus*** species. ***Polynemus specularis*** is therfore regarded as a junior synonym of ***Polydactylus multiradiatus*** (Motomura, Johnson and Iwatsuki, 2002). ***Polydactylus auratus***, described by McKay (1970) on the basis of 4 specimens from Napier Broome Bay, Western Australia, Australia, are also found to be conspecific with ***P. multiradiatus***. Their meristic and morphological characters are included in Motomura, Johnson and Iwatsuki (2002: table 1).

Grant (1982, 1995) provided figures (1985, pl. 273 and 1995, fig. 631a) of a threadfin identified as ***Polydactylus heptadactylus***. This species, now recognized as ***Filimanus heptadactyla***, is characterized by 11 or 12 anal-fin soft rays, whereas the threadfin figured by Grant (1982, 1995) clearly had 16 or more anal-fin soft rays. Therefore, Grant's ***P. heptadactylus*** is clearly ***P. multiradiatus***.

***Polydactylus multiradiatus*** can be easily distinguished from other Indo-Pacific congeners by the higher anal-fin soft ray counts (16 to 18 versus 10 to 13 in all others). Three Indo-Pacific ***Polydactylus*** species, ***P. macrophthalmus***, ***P. multiradiatus*** and ***P. mullani***, have 7 pectoral filaments. In addition to the difference in numbers of anal-fin soft rays, ***P. multiradiatus*** differs from ***P. macrophthalmus*** in having lower pored lateral-line scale counts [49 to 56 (mode 52) versus 87 to 94 (mode 88) in the latter], shorter pectoral filaments (no filaments extending beyond posterior tip of pectoral fin versus upper 3 filaments extending beyond caudal-fin base in ***P. macrophthalmus***) and occipital profile nearly straight throughout life (occipital profile concave in adults in ***P. macrophthalmus***). ***Polydactylus multiradiatus*** is clearly distinguished from ***P. mullani*** by the presence of vomerine teeth (absent in the latter) and absence of a large black spot anteriorly on the lateral line (present in ***P. mullani***).

## *Polydactylus nigripinnis* Munro, 1964 — Fig. 106; Plate IIIg

*Polydactylus nigripinnis* Munro, 1964: 156, fig. 4 [type locality: 4 km off east head of Purari River, Gulf of Papua, Papua New Guinea; holotype (CSIRO A. 1828, 103 mm standard length); 3 paratypes (CSIRO A. 1827, 96 mm standard length; CSIRO A. 1829, 108 mm standard length; CSIRO A. 1830, 100 mm standard length)].

**Synonyms:** None.

**FAO Names: En** - Blackfin threadfin; **Fr** - Barbure à nageoires noires; **Sp** - Barbudo de aletas negras.

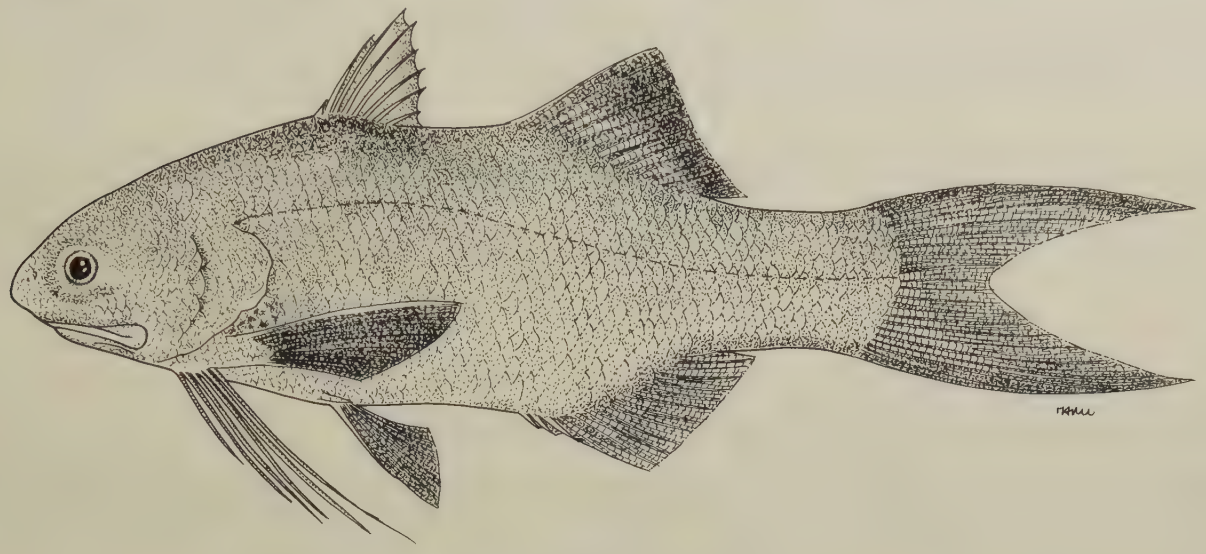


**Fig. 106** *Polydactylus nigripinnis*

**Diagnostic Features:** A small-sized species. Body depth at first dorsal-fin origin 30 to 36% (mean 33%) of standard length; head length 32 to 36% (mean 33%) of standard length. Snout pointed; occipital profile nearly straight. Posterior margin of maxilla extending slightly beyond level of posterior margin of adipose eyelid; upper-jaw length 14 to 16% (mean 15%) of standard length; depth of posterior margin of maxilla less than eye diameter; lip on lower jaw well developed, dentary teeth restricted to dorsal surface; teeth villiform in broad bands on palatines and ectopterygoids; vomerine tooth plate covered with skin and teeth absent. Posterior margin of preopercle serrated. First dorsal fin with VIII spines, all spine bases of similar thickness; second dorsal fin with I spine and 12 or 13 (mode 13) soft rays; anal fin with III spines and 11 to 13 (mode 12) soft rays, anal-fin base slightly greater than second dorsal-fin base; pectoral fin with 16 to 18 (mode 17) rays (all rays unbranched), its length 29 to 34% (mean 31%) of standard length, posterior tip extending well beyond level of posterior tip of pelvic fin; pectoral filaments 6; first (shortest) and second pectoral filaments not reaching to level of pelvic-fin origin; third to fifth pectoral filaments extending beyond level of pelvic-fin origin; sixth pectoral filament longest, its length 26 to 35% (mean 32%) of standard length, just short of level of posterior tip of pectoral fin; caudal fin deeply forked, upper and lower caudal-fin lobes not filamentous, upper caudal-fin lobe 36 to 45% (mean 42%) and lower lobe 36 to 40% (mean 39%) of standard length. Pored lateral-line scales 46 to 50 (mode 47); lateral line simple, extending from upper end of gill opening to upper end of lower caudal-fin lobe; scale rows above lateral line 7, below 11 to 13 (mode 11). Gillrakers 10 to 13 (mode 11) on upper limb, 14 to 16 (mode 15) on lower limb, 24 to 29 (mode 27) total. Vertebrae 10 precaudal and 14 caudal; supraneural bones 3. Swimbladder absent. **Colour:** Upper sides of head and trunk with slightly darkish silver tinge, becoming lighter on lower sides; snout semi-translucent; first and second dorsal fins yellowish white; anterior margin of pelvic fin yellowish, other parts white; anal fin white; pectoral fin dense black; pectoral filaments white; caudal fin darkish silver.

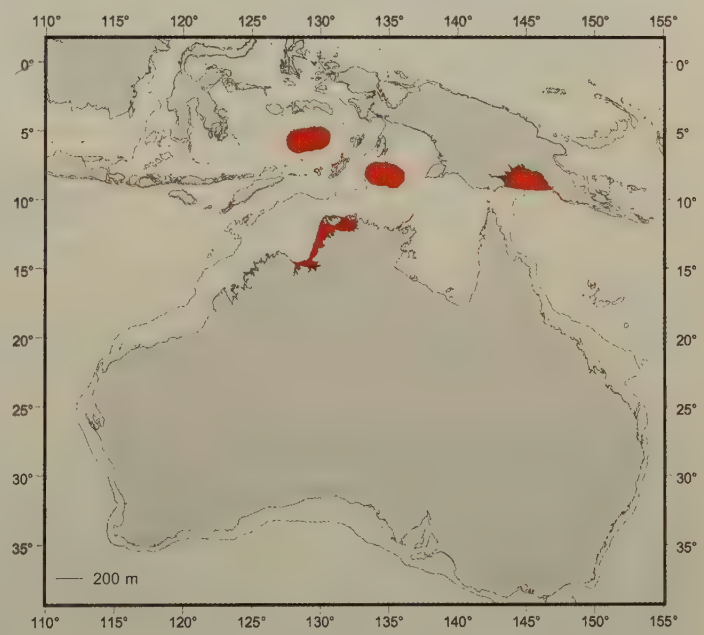



**Fig. 107** *Polydactylus nigripinnis*
Known distribution

**Geographical Distribution:** Currently known only from Papua New Guinea (Gulf of Papua), Australia (Cambridge Gulf, Western Australia to Van Diemen Gulf, Northern Territory) and the Arafura Sea (Fig. 107).

**Habitat and Biology:** Taken off river mouths in Australia and Papua New Guinea, and is also caught offshore in the Arafura Sea. No other data are available.

**Size:** Maximum standard length at least 15 cm (Feltes *in* Carpenter and Niem, 2001).

**Interest to Fisheries:** None.

**Local Names:** AUSTRALIA: Black-finned threadfin; PAPUA NEW GUINEA: Black-finned threadfin.

**Literature:** Feltes *in* Carpenter and Niem (2001); Motomura (2002).

**Remarks:** ***P. nigripinnis*** and 5 other species: ***P. malagasyensis***, ***P. microstomus***, ***P. mullani***, ***P. persicus*** and ***P. sextarius***, are all characterized by having the vomer covered with skin and without teeth. ***Polydactylus nigripinnis*** is easily distinguished from the others by lacking a large black spot anteriorly on the lateral line (present in the other 5 species) and having unbranched pectoral-fin rays (branched, except uppermost 1 or 2 in the other 5 species).

In the Indo-Pacific, only 3 species, ***P. longipes***, ***P. nigripinnis*** and ***P. sexfilis***, have 6 pectoral filaments and no black spot anteriorly on the lateral line. ***Polydactylus nigripinnis*** differs from ***P. sexfilis*** in having a vomer without teeth (present in the latter), lower counts of pored lateral-line scales [46 to 50 (mode 47) versus 61 to 67 (mode 64) in ***P. sexfilis***], swimbladder absent (present in ***P. sexfilis***) and smaller orbit diameter [5 to 7% (mean 6%) of standard length versus 8 to 11% (mean 9%) of standard length in ***P. sexfilis***]. Comparisons of ***P. nigripinnis*** with ***P. longipes*** are given in the account of the latter.

## ***Polydactylus octonemus*** (Girard, 1858) **Fig. 108; Plate IIIh**

***Polynemus octonemus*** Girard, 1858: 167 [type locality: Brazos Santiago and Galveston, Texas, USA; 3 syntypes presently known (ANSP 22900, 62 mm standard length; USNM 739, 2 specimens, 62 to 79 mm standard length)].

**Synonym:** ***Trichidion octofilis*** Gill, 1861: 280 [type locality: New York, USA; holotype (USNM 15074, 166 mm standard length)].

**FAO Names: En** - Atlantic threadfin; **Fr** - Barbure huit doigts atlantique; **Sp** - Barbudo ocho dedos atlántico.

**Fig. 108** ***Polydactylus octonemus***

**Diagnostic Features:** A medium-sized species. Body depth at first dorsal-fin origin 28 to 32% (mean 29%) of standard length; head length 27 to 33% (mean 31%) of standard length. Snout pointed; occipital profile nearly straight. Posterior margin of maxilla just reaching to or extending slightly beyond level of posterior margin of adipose eyelid; upper-jaw length 12 to 15% (mean 14%) of standard length; depth of posterior margin of maxilla less than eye diameter; lip on lower jaw well developed, dentary teeth restricted to dorsal surface; teeth villiform in broad bands on vomer, palatines and ectopterygoids. Posterior margin of preopercle serrated. First dorsal fin with VIII spines, all spine bases of similar thickness; second dorsal fin with I spine and 11 to 13 (mode 12) soft rays; anal fin with III spines and 12 to 14 (mode 13) soft rays, anal-fin base greater than second dorsal-fin base; pectoral fin with 14 to 16 (mode 15) rays (all rays unbranched), its length 24 to 29% (mean 27%) of standard length, posterior tip not reaching to level of posterior tip of pelvic fin (or just reaching in young specimens less than about 90 mm standard length); pectoral filaments 8 (rarely 9); first pectoral filament shortest, extending beyond level of

pelvic-fin origin; second to fifth pectoral filaments extending beyond level of pelvic-fin origin in adults (in young specimens less than about 90 mm standard length, third pectoral filament extending beyond level of posterior tip of pelvic fin, fourth pectoral filament reaching to level of anal-fin origin; fifth pectoral filament extending beyond level of anal-fin origin); sixth pectoral filament reaching to or extending slightly beyond level of posterior tip of pelvic fin in adults (extending beyond level of anal-fin origin in young); seventh pectoral filament not reaching to or extending beyond level of anal-fin origin; eighth pectoral filament longest, its length 39 to 51% (mean 43%) of standard length, not reaching to or extending beyond level of anal-fin origin in adults (reaching to level of midpoint of anal-fin base in young); caudal fin deeply forked, upper and lower caudal-fin lobes not filamentous, upper caudal-fin lobe 39 to 42% (mean 40%) and lower lobe 33 to 40% (mean 37%) of standard length. Pored lateral-line scales 56 to 64 (mode 59); lateral line bifurcated on caudal fin, extending to posterior margins of upper and lower caudal-fin lobes; scale rows above lateral line 6 or 7 (mode 6), below 10 to 12 (mode 11). Gillrakers 34 to 38 (mode 36). Vertebrae 10 precaudal and 14 caudal; supraneural bones 3. Swimbladder present, well developed. **Colour:** Upper sides of head and trunk with slightly darkish silver tinge, becoming lighter on lower sides; snout semi-translucent; first and second dorsal fins dusky yellow; pectoral fin black; pectoral filaments translucent; posterior margin of anal fin white, other parts dusky yellow; posterior margin of caudal fin blackish, other part dusky yellow.

**Geographical Distribution:** In the western Atlantic Ocean ranging from New York, USA to the west coast of Yucatán (Fig. 109).

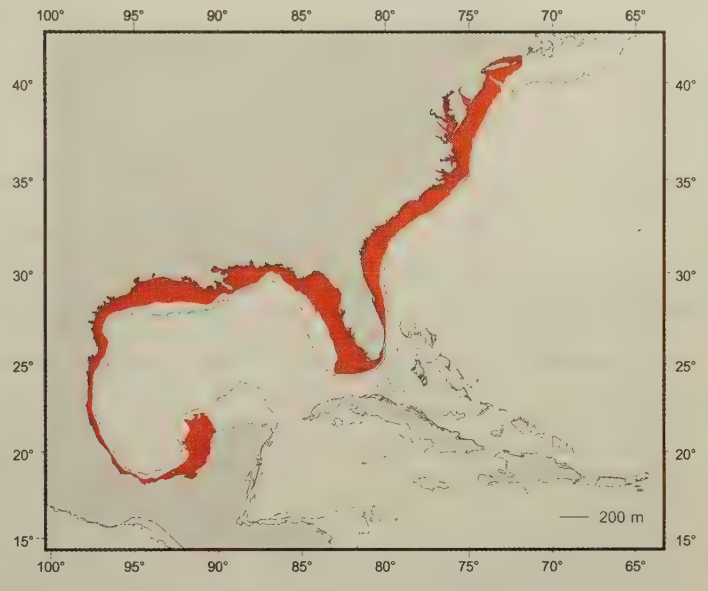



**Fig. 109** ***Polydactylus octonemus***
Known distribution

**Habitat and Biology:** Generally occurs on sandy or muddy bottoms and on beaches, frequently in the surf. The species is taken at depths from 5 to 66 m in the Gulf of Mexico (Springer and Bullis, 1956; Dentzau and Chittenden, 1990), but is most abundant at depths of 5 to 16 m (Dentzau and Chittenden, 1990). In the Gulf of Mexico, young specimens (less than about 66 mm) have been taken at the surface over water depths from 1 035 to 2 736 m.

Dentzau and Chittenden (1990) studied the biology of ***P. octonemus*** in detail. It generally matures between 165 and 210 mm total length (approaching 7 to 9 months of age) and probably spawns in the Gulf of Mexico, off Louisiana and Texas. Spawning primarily occurs from mid-December to midMarch, spanning 45 to 120 days overall. Larvae (2- to 4-month-olds) are recruited in waters less than 16 m, and then begin to disperse to deeper waters in early summer. The species ranges from 135 to 165 mm total length at 6 months, from 165 to 215 mm at 9 months and from 180 to 205 mm at 1 year. The typical maximum life span is about 1 year but may exceed that if individuals survive a pelagic stage after spawning.

**Size:** Maximum total length 23 cm, commonly to 20 cm (Dentzau and Chittenden, 1990).

**Interest to Fisheries:** Caught incidentally by seines and trawls and is of little commercial importance.

**Local Names:** None known.

**Literature:** Feltes *in* Carpenter (2003).

**Remarks:** Examination by the author of the holotype of ***Trichidion octofilis*** showed it to be conspecific with ***Polydactylus octonemus***, the former thereby being a junior synonym of the latter.

***Polydactylus octonemus***, ***P. oligodon*** and ***P. virginicus***, all occurring in the western Atlantic, are very similar to each other in overall body appearance. ***Polydactylus octonemus*** differs from the other 2 species in having higher counts of pectoral filaments [8 (rarely 9) versus 7 (rarely 8) in the other 2 species] and gillrakers [34 to 38 versus 22 to 30 in the other 2 species].

## ***Polydactylus oligodon*** (Günther, 1860)

**Fig. 110; Plate IVa**

***Polynemus oligodon*** Günther, 1860: 322 [original locality: Rio de Janeiro, Brazil and Jamaica, based on 2 syntypes; type locality: Rio de Janeiro, Brazil, based on a lectotype (BMNH 1853.4.18.23, 147 mm standard length) designated by Randall, 1966; paralectotype (BMNH 1848.1.12.890, stuffed specimen, 146 mm standard length)].

**Synonyms:** None.

**FAO Names: En** - Littlescale threadfin; **Fr** - Barbure à petites écailles; **Sp** - Barbudo de escamas pequeñas.

**Fig. 110** ***Polydactylus oligodon***

**Diagnostic Features:** A medium-sized species. Body depth at first dorsal-fin origin 27 to 30% (mean 28%) of standard length; head length 30 to 33% (mean 32%) of standard length. Snout pointed; occipital profile nearly straight. Posterior margin of maxilla just short of or reaching to level of posterior margin of adipose eyelid; upper-jaw length 13 to 15% (mean 14%) of standard length; depth of posterior margin of maxilla less than eye diameter; lip on lower jaw well developed, dentary teeth restricted to dorsal surface; teeth villiform in broad bands on vomer, palatines and ectopterygoids. Posterior margin of preopercle serrated. First dorsal fin with VIII spines, all spine bases of similar thickness; second dorsal fin with I spine and 11 or 12 (mode 12) soft rays; anal fin with III spines and 13 to 15 (mode 14) soft rays, anal-fin base greater than second dorsal-fin base; pectoral fin with 15 or 16 (mode 16) rays (all rays unbranched), its length 22 to 24% (mean 23%) of standard length, posterior tip not reaching to level of posterior tip of pelvic fin; pectoral filaments 7 (rarely 8); first pectoral filament shortest, extending slightly beyond level of pelvic-fin origin; second and third pectoral filaments extending beyond level of pelvic-fin origin; fourth pectoral filament reaching to level of posterior tip of pelvic fin; fifth pectoral filament reaching to or extending beyond level of posterior tip of pelvic fin; sixth pectoral filament reaching to or extending slightly beyond level of anal-fin origin; seventh pectoral filament longest, its length 31 to 41% (mean 38%) of standard length, extending beyond level of anal-fin origin; caudal fin deeply forked, upper and lower caudal-fin lobes not filamentous, upper caudal-fin lobe 40 to 43% (mean 42%) and lower lobe 37 to 41% (mean 39%) of standard length. Pored lateral-line scales 67 to 73 (mode 70); lateral line bifurcated on caudal fin, extending to posterior margins of upper and lower caudal-fin lobes; scale rows above lateral line 7 to 9 (mode 9), below 11 to 14 (mode 13). Gillrakers 22 to 30 (mode 27). Vertebrae 10 precaudal and 14 caudal; supraneural bones 3. Swimbladder present. **Colour:** Upper sides of head and trunk with slightly darkish silver tinge, becoming lighter on lower sides; snout semi-translucent; first and second dorsal fins translucent; pectoral fin white with a small number of melanophores; pectoral filaments and pelvic fin white; base and posterior margin of anal fin white, other parts translucent; posterior margin of caudal fin blackish, other part whitish.

**Geographical Distribution:** In the western Atlantic Ocean ranging from the east coast of Florida (at least to Fort Lauderdale), USA to Santos, Brazil, including the Antilles, Venezuela, Guyana, Suriname and French Guiana (Fig. 111). However, the species does not occur in the Gulf of Mexico and western Caribbean Sea.

**Habitat and Biology:** Occurs close to the shore in surf along exposed sandy beaches. No other data are available.

**Size:** Maximum total length 46 cm (Feltes *in* Carpenter, 2003).

**Interest to Fisheries:** Caught incidentally by seines and trawls and is of little commercial importance.

**Local Names:** BAHAMAS: Smallscale threadfin; DOMINICA: Barbú.

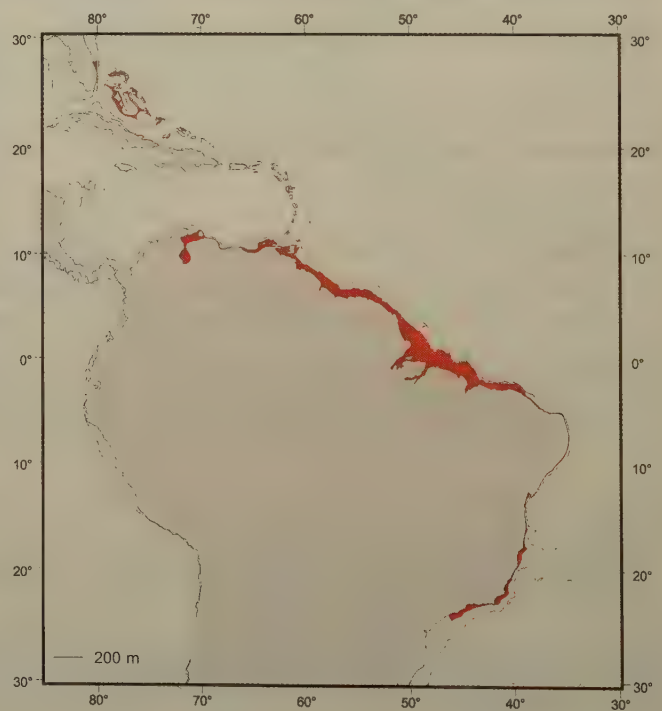



**Fig. 111** ***Polydactylus oligodon***
Known distribution

**Literature:** Feltes *in* Carpenter (2003).

**Remarks:** Although ***Polydactylus oligodon***, originally described from Rio de Janeiro, Brazil and Jamaica on the basis of 2 specimens, had long been regarded as a junior synonym of ***P. virginicus*** by many authors, Randall (1966) recognized the former as valid and designated a lectotype for the species. Randall (1966) noted differences between ***P. oligodon*** and ***P. virginicus*** in the shape of the posterior margin of the maxilla, and certain meristic characters (including numbers of lateral-line scales, pectoral-fin rays and anal-fin rays) and proportional measurements (including length of anal-fin base). In particular, the rounded shape of the posterior margin of the maxilla has been subsequently treated as a diagnostic character for ***P. oligodon*** (versus truncate to concave in ***P. virginicus***) in many publications (e.g. Randall *in* Fischer, 1978; Cervigón *in* Cervigón *et al.*, 1993; Randall, 1996). According to Feltes *in* Carpenter (2003) and confirmed by examination by the author, however, that character shows considerable individual variation and it is difficult to clearly distinguish between ***P. oligodon*** and ***P. virginicus*** on that basis.

Although ***P. oligodon*** and ***P. virginicus*** are very similar to each other and distinction between the 2 species in recent literature is somewhat confused, ***P. oligodon*** can be distinguished from the latter by the higher counts of pored lateral-line scales [67 to 73 (mode 70) versus 54 to 63 (mode 58) in the latter].

## *Polydactylus opercularis* (Gill, 1863) **Fig. 112; Plate IVb**

***Trichidion opercularis*** Gill, 1863: 168 (type locality: west coast of Central America, probably Cape San Lucas, Baja California, Mexico; holotype apparently lost, see Motomura, Kimura and Iwatsuki, 2002).

**Synonyms:** ***Polynemus melanopoma*** Günther, 1864: 148 [type locality: San José, Guatemala; holotype (BMNH 1864.1.26.321, 263 mm standard length)].

**FAO Names: En** - Yellow bobo; **Fr** - Barbure jaune; **Sp** - Barbudo amarillo.

**Fig. 112** ***Polydactylus opercularis***

**Diagnostic Features:** A medium-sized species. Body depth at first dorsal-fin origin 25 to 29% (mean 27%) of standard length; head length 29 to 33% (mean 31%) of standard length. Snout pointed; occipital profile nearly straight throughout life. Posterior margin of maxilla extending well beyond level of posterior margin of adipose eyelid; maxilla covered with small deciduous scales; upper-jaw length 16 to 18% (mean 17%) of standard length; depth of posterior margin of maxilla less than eye diameter; anterior parts of lower jaw with villiform teeth extending onto lateral surface, adjacent portion of lip poorly developed in larger specimens; teeth villiform in broad bands on vomer, palatines and ectopterygoids; tooth plate on palatines wider than those on ectopterygoids; shape of vomerine tooth plate nearly square. Posterior margin of preopercle serrated. First dorsal fin with VIII spines, thickness of all first dorsal-fin spine bases similar; second dorsal fin with I spine and 11 to 13 (mode 12) soft rays; anal fin with III spines and 12 to 14 (mode 13) soft rays, anal-fin base slightly greater than second dorsal-fin base; pectoral fin with 14 to 16 (mode 15) rays (all rays unbranched), its length 20 to 24% (mean 22%) of standard length, posterior tip not reaching to level of posterior tip of pelvic fin; pectoral filaments 9 (rarely 8 or asymmetrically 8 and 9), first filament shortest, not reaching to or extending slightly beyond level of posterior tip of pelvic fin; lengths of

second to ninth pectoral filaments similar, its length 30 to 41% (mean 36%) of standard length, extending beyond level of posterior tip of pelvic fin or level of anal-fin origin, sometimes not reaching to level of posterior tip of pelvic fin; entire well-developed membranes present on dorsal margins of pectoral filaments; caudal fin deeply forked, upper and lower caudal-fin lobes not filamentous, upper caudal-fin lobe 31 to 38% (mean 35%) and lower lobe 30 to 36% (mean 33%) of standard length. Pored lateral-line scales 66 to 74 (mode 70); lateral line simple, extending from upper end of gill opening to upper end of lower caudal-fin lobe; scale rows above lateral line 7 to 10 (mode 8), below 12 to 15 (mode 13). Gillrakers 13 to 18 (mode 16) on upper limb, 17 to 20 (mode 19) on lower limb, 31 to 37 (mode 34) total. Vertebrae 10 precaudal and 14 caudal; supraneural bones 2. Swimbladder absent. **Colour:** Head and body pale green dorsally, silver ventrally; posterior margins of first and second dorsal fins dark yellow, remaining parts dusky; pectoral fin dusky; base of pectoral filaments white, becoming yellow on posterior tips; posterior tip of pelvic fin yellow, remaining parts white; base of anal fin white, remaining parts vivid yellow; lower caudal-fin lobe dark yellow, upper lobe dusky.

**Geographical Distribution:** Currently known from the eastern Pacific Ocean (Fig. 113), where it ranges from northern Los Angeles Harbor, California, USA to off Paita, Peru, being relatively rare north of Baja California, Mexico. The record from off Paita, Peru was based on a single juvenile specimen (12 mm total length; Hildebrand, 1946).

**Habitat and Biology:** Generally inhabits muddy or sandy bottoms in coastal waters and estuaries, but also occurs along sandy beaches (Allen and Robertson, 1994). Most of the collection data available indicates it occurs in depths less than 46 m.

**Size:** Maximum total length at least 45 cm (Allen and Robertson, 1994).

**Interest to Fisheries:** Esteemed as a food fish throughout the tropical eastern Pacific.

**Local Names:** COLOMBIA: Barbeta; MEXICO: Barbudo amarillo.

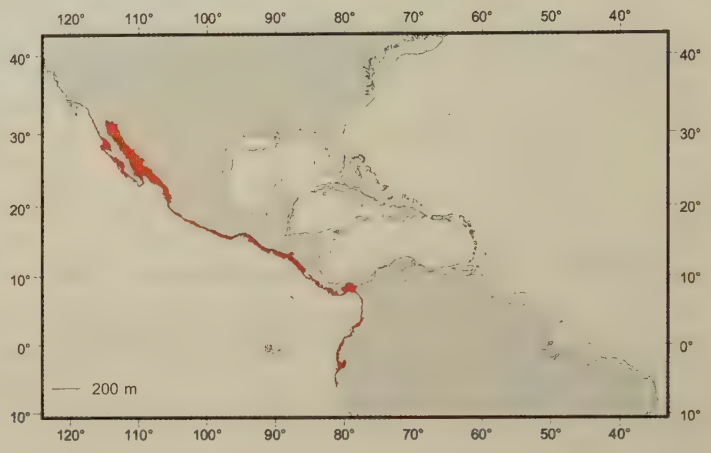



**Fig. 113** *Polydactylus opercularis*
Known distribution

**Literature:** Motomura, Kimura and Iwatsuki (2002).

**Remarks:** ***P. melanopoma***, originally described by Günther (1864) from San José, Guatemala on the basis of a single specimen (BMNH 1864.1.26.321, 263 mm standard length), was synonymized under ***P. opercularis***, originally described by Gill (1863) (as ***Trichidion opercularis***) on the basis of a single specimen (apparently lost) (Motomura, Kimura and Iwatsuki, 2002).

***Polydactylus opercularis*** is easily distinguished from other congeners by having usually 9 pectoral filaments (usually 4 to 8 filaments in the latter). The number of pectoral filaments in an Atlantic west coast species, ***P. octonemus***, although usually 8, infrequently number 9, thereby overlapping with ***P. opercularis*** which has 8 pectoral filaments on rare occasions. However, ***P. octonemus*** differs from the latter in having lower pored lateral-line scale counts [56 to 64 (mode 59) versus 66 to 74 (mode 70) in ***P. opercularis***], well-developed lower-jaw lips throughout life (lips on anterior parts of lower jaws poorly developed in larger specimens of ***P. opercularis***) and a swimbladder present (absent in ***P. opercularis***). The condition of the lower jaw lips and teeth (anterior parts of lower jaw with villiform teeth extending onto lateral surface, adjacent portion of lip poorly developed) found in larger ***P. opercularis*** is unique among the genus, although the condition is also found in all stages of ***Leptomelanosoma indicum*** and larger ***Parapolynemus verekeri***.

***Polydactylus opercularis*** lacks a swimbladder, and 3 Indo-West Pacific ***Polydactylus*** species, ***P. multiradiatus***, ***P. nigripinnis*** and ***P. siamensis*** also lack a swimbladder. ***Polydactylus opercularis*** can be easily distinguished from the others by having 9 pectoral filaments (5 in ***P. siamensis***, 6 in ***P. nigripinnis*** and 7 in ***P. multiradiatus***). Comparisons of ***P. opercularis*** with a eastern Pacific species, ***P. approximans*** are given in the account of the latter.

## ***Polydactylus persicus*** Motomura and Iwatsuki, 2001

**Fig. 114; Plate IVc**

***Polydactylus persicus*** Motomura and Iwatsuki, 2001b: 347, figs. 5, 7D [type locality: Kuwait Bay, Kuwait, Persian Gulf (29°30'N, 47°50'E); holotype (MCZ 60001, 121 mm standard length); 12 paratypes (AMS I. 40432-001, 103 mm standard length; BMNH 2000.9.25.1, 93 mm standard length; KU 10528, 112 mm standard length; MCZ 59251 (5 specimens, including 1, 63 mm standard length, cleared and stained), 48-80 mm standard length; MCZ 158350 (2), 92-121 mm standard length; MUFS 20410, 124 mm standard length; USNM 363075, 96 mm standard length)].

**Synonyms:** None.

**FAO Names: En** - Persian blackspot threadfin; **Fr** - Barbure à tâche noire de Perse; **Sp** - Barbudo de mancha negra persa.

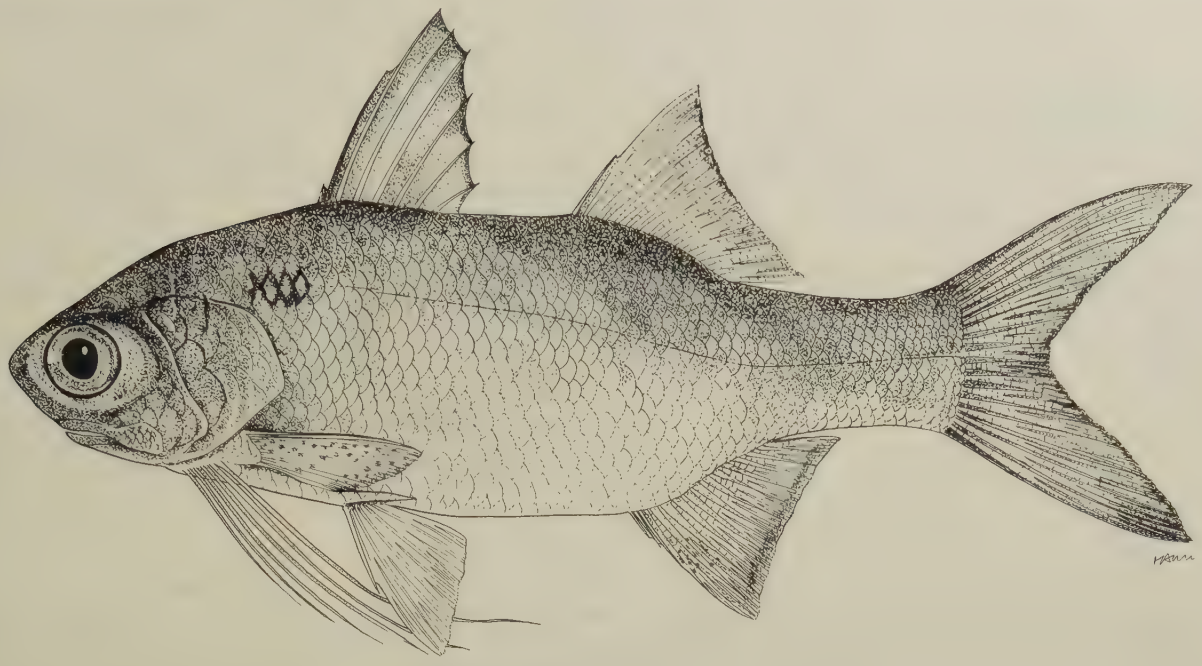


**Fig. 114** ***Polydactylus persicus***

**Diagnostic Features:** A small- to medium-sized species. Body depth at first dorsal-fin origin 33 to 35% (mean 34%) of standard length; head length 31 to 34% (mean 33%) of standard length. Snout pointed; occipital profile nearly straight. Posterior margin of maxilla not reaching to level of posterior margin of adipose eyelid; upper-jaw length 13 to 15% (mean 14%) of standard length; depth of posterior margin of maxilla less than eye diameter; lip on lower jaw well developed, dentary teeth restricted to dorsal surface; teeth villiform in broad bands on palatines and ectopterygoids; vomerine tooth plate covered with skin and teeth absent; palatines straight anteriorly. Posterior margin of preopercle serrated. First dorsal fin with VIII spines, second spine slightly more robust than others; second dorsal fin with I spine and 12 or 13 (mode 13) soft rays; anal fin with III spines and 12 soft rays, anal-fin base approximately equal to second dorsal-fin base; pectoral fin with 12 to 14 (mode 12) rays (all rays unbranched, except uppermost 1 or 2), its length 18 to 20% (mean 19%) of standard length, posterior tip not reaching to level of posterior tip of pelvic fin; pectoral filaments 6, first filament shortest; sixth pectoral filament longest, its length 26 to 36% (mean 32%) of standard length, extending well beyond level of posterior tip of pectoral fin; caudal fin deeply forked, upper and lower caudal-fin lobes not filamentous, upper caudal-fin lobe 35 to 40% (mean 38%) and lower lobe 34 to 44% (mean 37%) of standard length. Pored lateral-line scales 46 to 49 (mode 48); lateral line simple, extending from upper end of gill opening to upper end of lower caudal-fin lobe; scale rows above lateral line 5 or 6 (mode 6), below 8 or 9 (mode 9). Gillrakers 12 to 16 (mode 13) on upper limb, 17 to 20 (mode 19) on lower limb, 29 to 35 (mode 32) total. Vertebrae 10 precaudal and 14 caudal; supraneural bones 3. Swimbladder present, well developed. **Colour:** Head and upper sides of trunk with slightly darkish silver tinge, becoming lighter on lower sides; snout semi-translucent; posterior margin of first and second dorsal fins and caudal fin indistinctly blackish, other parts translucent; pectoral-fin membrane white with scattered melanophores; pectoral filaments whitish, becoming blackish on posterior tips; pelvic fin whitish; a large black spot anteriorly on lateral line.

**Geographical Distribution:** Currently known only from the Persian Gulf (Fig. 115).

**Habitat and Biology:** Occurs on sandy and muddy bottoms in shallow waters (less than 10 m). No other data are available.

**Size:** Maximum standard length at least 16 cm.

**Interest to Fisheries:** An important fishery species in Kuwait, caught mainly by trawl and gill net.

**Local Names:** ISLAMIC REPUBLIC OF IRAN: Taer; KUWAIT: Ghazal.

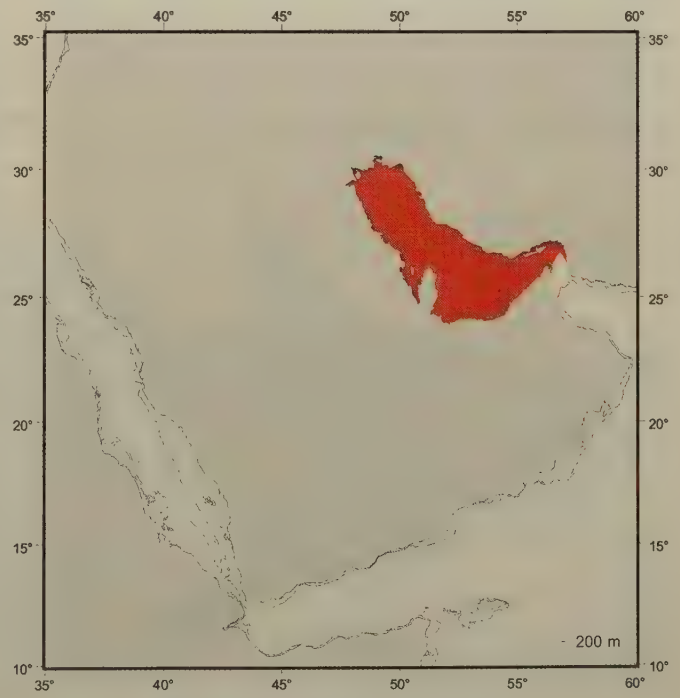



**Fig. 115** ***Polydactylus persicus***
Known distribution

**Literature:** Motomura and Iwatsuki (2001b); Motomura (2002).

**Remarks:** *P. persicus*, previously identified as *P. sextarius* (e.g. Kuronuma and Abe, 1972; Randall, 1995; Carpenter *et al.*, 1997), was recently described as a new species on the basis of 13 specimens (Motomura and Iwatsuki, 2001b).

Five *Polydactylus* species: *P. malagasyensis*, *P. microstomus*, *P. mullani*, *P. persicus* and *P. sextarius*, are characterized by having all pectoral-fin rays branched, except the uppermost 1 or 2, the vomer without teeth and a large black spot anteriorly on the lateral line. *Polydactylus persicus* can be easily distinguished from *P. microstomus* and *P. mullani* by the number of pectoral filaments [6 versus 5 (rarely asymmetrically 5 and 6) and 7 (rarely asymmetrically 6 and 7), respectively, in *P. microstomus* and *P. mullani*].

*Polydactylus persicus* differs from *P. sextarius* in having a well-developed swimbladder (length about 40 to 45% of standard length versus an atrophied, string-like swimbladder, about 20% of standard length in the latter; see Motomura and Iwatsuki, 2001b: fig. 7), higher counts of gillrakers [29 to 35 (mode 32) versus 25 to 30 (mode 28) in *P. sextarius*]. Furthermore, the second dorsal-fin spine length in *P. persicus* [6 to 9% (mean 7%) of standard length] is significantly longer than that of *P. sextarius* [5 to 8% (mean 6%) of standard length]. Comparisons of *P. persicus* with *P. malagasyensis* are given in the account of the latter.

## *Polydactylus plebeius* (Broussonet, 1782)

**Fig. 116; Plate IVd-h**

*Polynemus plebeius* Broussonet, 1782: described on twentyseventh page from the table of contents, eighth plate (seventh species) (no pagination) [original locality: Tahiti, Society Islands and Tanna Island, New Hebrides Islands, Vanuatu; type locality: Tahiti, Society Islands, based on a neotype (FMNH 108655, 88 mm standard length) designated by Motomura, Iwatsuki and Yoshino, 2001].

**Synonyms:** *Polynemus emoi* Lacepède, 1803: 410, 412 (type locality: Tahiti, Society Islands, replacement name for *P. plebeius* Broussonet; no types known, see Motomura, Iwatsuki and Yoshino, 2001). *Polynemus lineatus* Lacepède, 1803: 410, pl. 13, fig. 2 [type locality: Réunion Island, Mascarene Islands; holotype (MNHN A. 5440, stuffed specimen, 255 mm standard length)]. *Polynemus niloticus* Shaw, 1804:151 [type locality: Nile River, Africa (but probably erroneous, see Motomura, Iwatsuki and Yoshino, 2001), based on a figure and description by J. Bruce; no types known]. *Polynemus commersonii* Shaw, 1804: 156 (type locality: Indian seas, based on a figure by P. Commerson; replacement name for *P. lineatus* Lacepède; no types known, see Motomura, Iwatsuki and Yoshino, 2001). *Polynemus lineatus* Günther, 1860 (not of Lacepède): 327 (primary homonym of *P. lineatus* Lacepède). *Polynemus taeniatus* Günther, 1860: 526 [type locality: Ambon, Indonesia and Guadalcanal, Solomon Islands; replacement name for *P. lineatus* Günther; 2 syntypes (BMNH 1855.11.7.35, 139 mm standard length; BMNH 1858.4.21.85, 147 mm standard length)]. *Polydactylus agonasi* Jordan and McGregor, 1906: 814, unnumbered figure on page 815 [type locality: Tokyo, Japan; holotype (USNM 55608, 155 mm standard length); 2 paratypes (CAS 109879, 105 to 148 mm standard length)]. *Polynemus lydiae* Curtiss, 1938: 43 (type locality: Tahiti, Society Islands; no types known, see Motomura, Iwatsuki and Yoshino, 2001).

**FAO Names: En** - Striped threadfin; **Fr** - Barbure rayé; **Sp** - Barbudo rayado.

**Fig. 116** *Polydactylus plebeius*

**Diagnostic Features:** A medium-sized species. Body depth at first dorsal-fin origin 25 to 32% (mean 28%) of standard length; head length 25 to 34% (mean 31%) of standard length. Snout pointed; occipital profile nearly straight. Posterior margin of maxilla reaching to or extending slightly beyond level of posterior margin of adipose eyelid; upper-jaw length 13 to 16% (mean 15%) of standard length; depth of posterior margin of maxilla less than eye diameter; lip on lower jaw well developed, dentary teeth restricted to dorsal surface; teeth villiform in broad bands on vomer, palatines and ectopterygoids. Posterior margin of preopercle serrated. First dorsal fin with VIII spines, all spine bases of similar thickness; second dorsal fin with I spine and 12 or 13 (mode 13) soft rays; anal fin with III spines and 11 or 12 (mode 11) soft rays, anal-fin base approximately equal to second dorsal-fin base; pectoral fin with 16 to 18 (mode 17, rarely 15) rays (all rays unbranched), its length 17 to 28% (mean 20%) of standard length, posterior tip not reaching to level of posterior tip of pelvic fin; pectoral filaments 5; first pectoral filament shortest, just short of or reaching to level of pelvic-fin origin; second to fourth pectoral filaments not reaching to level of posterior tip of pelvic fin; fifth pectoral filament longest, its length 22 to 40% (mean 32%) of standard length, reaching to or extending beyond level of posterior tip of pelvic fin; caudal fin deeply forked, upper and lower caudal-fin lobes not filamentous, upper caudal-fin lobe 33 to 44% (mean 39%) and lower lobe 30 to 41% (mean 36%) of standard length. Pored lateral-line scales 60 to 68 (mode 63); lateral line simple, extending from upper end of gill opening to upper end of lower caudal-fin lobe; scale rows above lateral line 8 or 9 (mode 8), below 12 or 13 (mode 12). Gillrakers 9 to 14 (mode 11) on upper limb, 13 to 18 (mode 15) on lower limb, 24 to 32 (mode 26) total. Vertebrae 10 precaudal and 14 caudal; supraneural bones 3. Swimbladder present. **Colour:** Head and upper sides of trunk tinged slightly blackish silver, becoming lighter silver on lower sides; abdominal region white; snout semi-transparent; first and second dorsal fins and caudal fin pale with blackish posterior margins; pectoral-fin membrane blackish; pectoral filaments white; anterior margins and origins of pelvic and anal fins white, other parts dusky yellowish white; 7 or 8 prominent dark stripes along scale rows above lateral line, 7 to 9 faint stripes below.

**Geographical Distribution:** Widely distributed in the Indo-Pacific ranging from South Africa to French Polynesia (Fig. 117). In the Pacific Ocean, the northernmost and southernmost recorded ranges of the species are Korea and Port Stephens, New South Wales, Australia, respectively. There are no records of ***P. plebeius*** having been collected from the Red Sea or Persian Gulf.

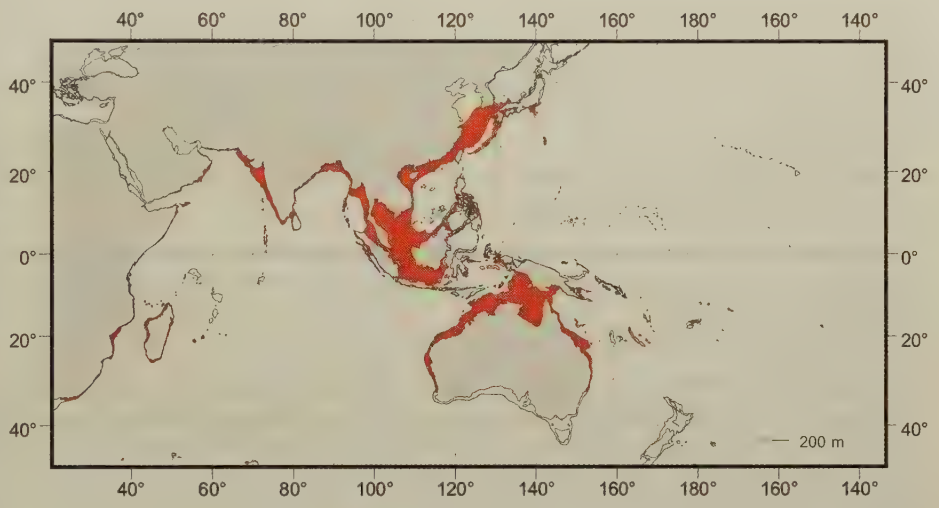



**Fig. 117** ***Polydactylus plebeius***
Known distribution

**Habitat and Biology:** Occurs along shallow, sandy or muddy coastal beaches to relatively deep waters (less than 122 m), as well as in estuaries. The species also occurs offshore in Miyazaki, southern Japan during the rainy (June and July) and typhoon seasons (September and October) (Motomura, Iwatsuki and Yoshino, 2001). Apparently, ***P. plebeius*** usually inhabits estuaries and shallow coastal waters at Miyazaki, but migrates during periods of high rainfall. Large numbers of juveniles are taken from river mouths. The species usually forms loosely-associated schools throughout life.

Hida (1967) reported the sex composition of 10 specimens (180 to 264 mm standard length) of ***P. plebeius*** from western Pakistan as: 1 hermaphrodite, 1 immature male and 8 immature females. No other biological studies, including maturation, size at maturity, spawning, spawning grounds or age, have been published.

Venkataramam (1960) examined the stomachs of 42 specimens (99 to 185 mm standard length) from inshore waters off Kozhikode, southwestern India, finding 15 specimens to be empty and the remainder gorged with a crab, *Emerita asiatica*. In addition, a congener, ***P. mullani***, was found in the stomach of a single individual ***P. plebeius*** from Pakistan (Hida, 1967). Feeding behaviour of the species in an aquarium was reported by Motomura, Sado and Kimura (2002).

**Size:** Maximum standard length at least 45 cm (Feltes *in* Carpenter and Niem, 2001).

**Interest to Fisheries:** An important fishery species for South Asia, Southeast Asia, and (especially) Melanesia and Polynesia, caught by trawls, gill nets, handlines and beach seines.

**Local Names:** FIJI: Uculuka; INDONESIA: Kuro, Lajan, Lausan, Mamangi, Manangi, Sumbal, Tapasan; JAPAN: Tsubame-konoshiro; MALAYSIA: Senangin, Senangin buih; MARIANAS: Pääwänér; MAURITIUS: Mulet bâtard, Thread-fish; MOZAMBIQUE: Barudo raiado; MYANMAR: Za yaw; NEW CALEDONIA: Hwa-n le kale-n, Noxan; PAPUA NEW GUINEA: Common threadfin; SAMOA; I'ausi, Umi'umia; SOMALIA: Samaduul; SOUTH AFRICA: Gestreepe, Striped threadfin; SRI LANKA: Barmeen, Polekala; TAHITI: Moi; UNITED REPUBLIC OF TANZANIA: Kupe, Mkizi komo maji; TUAMOTO: Moi.

**Literature:** Motomura, Iwatsuki and Yoshino (2001); Motomura (2002).

**Remarks:** *P. plebeius*, which is the oldest available name for Indo-Pacific species in that genus, was originally described by Broussonet (1782) from Tahiti, Society Islands and Tanna Island, New Hebrides Islands, Vanuatu (syntypes apparently lost). Although the original description of *P. plebeius* is very poor, the figure clearly shows 16 pectoral fin rays, 5 pectoral filaments and several longitudinal dark stripes along each scale row on the lateral body surface.

The holotype (a dried specimen) of *Polynemus lineatus*, 2 syntypes of *P. taeniatus* and the holotype and 2 paratypes of *Polydactylus agonasi* were all found to be conspecific with *P. plebeius* (see Motomura, Iwatsuki and Yoshino, 2001). Günther (1860) described *Polynemus lineatus* as a new species on the basis of 2 specimens from Ambon, Indonesia and Guadalcanal, Solomon Islands. Because that name was preoccupied by *P. lineatus* of Lacepède (1803), Günther (1860) proposed a replacement name, *P. taeniatus*, in an addenda to the original description of the species. In addition, Günther (1860) described *P. plebejus* (sic) (= *plebeius*) as being characterized by 5 pectoral filaments and a black blotch on the lateral line near its origin. Because the characters for *P. plebejus* given by Günther (1860) agree with those diagnostic of *Polydactylus microstomus*, it is considered that he had misidentified examples of the latter.

Lacepède (1803) and Shaw (1804) proposed new names, *Polynemus emoi*, for *P. plebeius* and *P. commersonii* for *P. lineatus*, respectively, but did not list any specimens. The new names have no standing in nomenclature, because the principle of priority was not followed, contrary to the requirements of Article 23 (ICZN-1999). *Polynemus niloticus* was described by Shaw (1804) as a new species on the basis of a description and figure by J. Bruce. According to Shaw (1804), the species had a unique character, a reddish snout. However, the snout of polynemid fishes is semi-transparent and cartilagenous and easily damaged, causing a reddish coloration. *Polynemus niloticus* is also considered conspecific with *Polydactylus plebeius* (Cantor, 1849; Daget and Njock *in* Daget *et al.*, 1986; Motomura, Iwatsuki and Yoshino, 2001).

*Polynemus lydiae* was described by Curtiss (1938) as a new species from Tahiti, Society Islands (no types known). According to the original description, the species was characterized by 5 pectoral filaments and longitudinal black stripes on the lateral body surface, characteristics being consistent with those of *Polydactylus plebeius*. Therefore, *Polynemus lydiae* is also regarded as a junior synonym of the latter (Motomura, Iwatsuki and Yoshino, 2001).

Fricke (1999) was synonymized *Sciaena pentadactyla* Lacepède, 1802 with *P. plebeius*. However, Motomura, Iwatsuki and Yoshino (2001) recognized that *S. pentadactyla* is not a junior synonym of *P. plebeius*, although the taxonomic status of the former is still unknown (treated as *nomen dubium*).

To date, only *P. plebeius* has been recognized as having 5 pectoral filaments and several prominent dark stripes along the longitudinal scale rows above and below the lateral line. Two other species, *P. bifurcus* and *P. siamensis*, with the characters has recently been described from Indonesia and Thailand, respectively. Comparisons of *P. plebeius* with *P. bifurcus* are given in the account of the latter.

Although *P. plebeius* is very similar to *P. siamensis* in having the above characters, the former differs in having higher counts of pectoral-fin rays [16 to 18 (mode 17; rarely 15, 1 of 100 specimens examined by Motomura, Iwatsuki and Yoshino, 2001) versus 15 in the latter], scales above and below the lateral line [8 or 9 (mode 8) and 12 or 13 (mode 12), respectively versus 7 and 10 or 11 (mode 11), respectively in *P. siamensis*], pored lateral-line scales [60 to 66 (mode 63; rarely 68, 1 of 96 specimens) versus 54 to 58 (mode 54) in *P. siamensis*] and gillrakers [9 to 14 (mode 11) upper series, 13 to 18 (mode 15) lower and 24 to 30 (mode 26; rarely 32, 1 of 96 specimens) total versus 9 or 10 (mode 10), 13 or 14 (mode 13) and 22 to 24 (mode 23), respectively in *P. siamensis*] (see Motomura, Iwatsuki and Yoshino, 2001: table 3). Furthermore, *P. plebeius* tends to have a slightly shorter upper jaw [13 to 16% (mean 15%) of standard length] than *P. siamensis* [16 to 17% (mean 17%) of standard length], although the proportional measurements for upper-jaw length overlapped between the 2 species (Motomura, Iwatsuki and Yoshino, 2001: fig. 3).

## *Polydactylus quadrifilis* (Cuvier, 1829) **Fig. 118; Plate Va**

*Polynemus quadrifilis* Cuvier *in* Cuvier and Valenciennes, 1829: 390, pl. 68 [type locality: Senegal; holotype (MNHN 756, lacking caudal fin and half of caudal peduncle, 380 mm from anterior tip of snout to posterior end of remaining peduncle)].

**Synonyms:** None.

**FAO Names: En** - Giant African threadfin; **Fr** - Gros capitaine; **Sp** - Barbudo gigante africano.

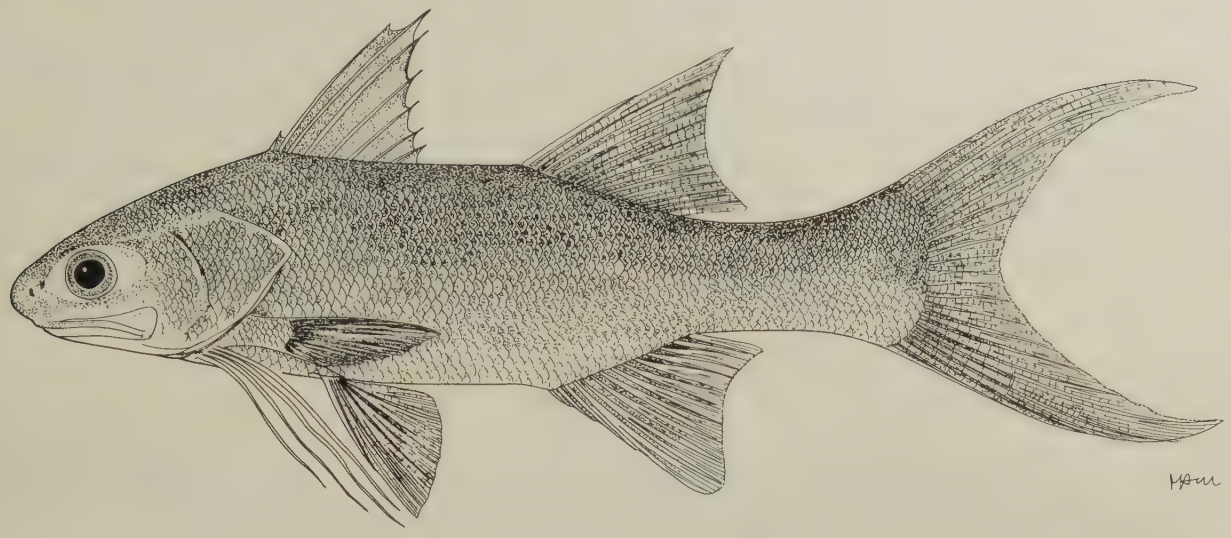


**Fig. 118** ***Polydactylus quadrifilis***

**Diagnostic Features:** A large species. Body depth at first dorsal-fin origin 24 to 27% (mean 25%) of standard length; head length 30 to 34% (mean 32%) of standard length. Snout pointed; occipital profile nearly straight. Posterior margin of maxilla not reaching to or just reaching to level of posterior margin of adipose eyelid; upper-jaw length 13 to 14% (mean 14%) of standard length; depth of posterior margin of maxilla less than eye diameter; lip on lower jaw well developed, dentary teeth restricted to dorsal surface; teeth villiform in broad bands on vomer, palatines and ectopterygoids. Posterior margin of preopercle serrated. First dorsal fin with VIII spines, second spine more robust than others; second dorsal fin with I spine and 13 soft rays; anal fin with III spines and 11 soft rays, anal-fin base approximately equal to second dorsal-fin base; pectoral fin with 12 or 13 (mode 13) rays (all rays unbranched), its length 20 to 24% (mean 22%) of standard length, posterior tip not reaching to level of posterior tip of pelvic fin; pectoral filaments 4; first (shortest) to third pectoral filaments, extending beyond level of pelvic-fin origin, but not reaching to level of posterior tip of pelvic fin; fourth pectoral filament longest, its length 27 to 39% (mean 33%) of standard length, just short of or extending slightly beyond level of posterior tip of pelvic fin; caudal fin deeply forked, upper and lower caudal-fin lobes not filamentous, upper caudal-fin lobe 34 to 41% (mean 38%) and lower lobe 33 to 40% (mean 37%) of standard length. Pored lateral-line scales 70 or 71 (mode 70); lateral line simple, extending from upper end of gill opening to upper end of lower caudal-fin lobe; scale rows above lateral line 8 or 9 (mode 9), below 11 to 13 (mode 11). Gillrakers 8 or 9 (mode 9) on upper limb, 12 to 14 (mode 14) on lower limb, 21 to 23 (mode 23) total. Vertebrae 10 precaudal and 14 caudal; supraneural bones 2. Swimbladder present, well developed. **Colour:** Head and upper sides of trunk tinged slightly blackish silver, becoming lighter silver on lower sides; abdominal region white; snout semi-transparent; first and second dorsal fins and caudal fin pale with blackish posterior margins; pectoral fin vivid yellow; pectoral filaments white; anterior margins and origins of pelvic and anal fins white, other parts dusky.

**Geographical Distribution:** On the west coast of Africa ranging from Senegal to the Congo (Fig. 119).

**Habitat and Biology:** Occurs on sandy and muddy bottoms in shallow waters (less than 55 m), sometimes also in brackish waters. Feeds mainly on crabs (Longhurst, 1960: table 1) and fishes.

**Size:** Maximum total length 2 m (Daget and Njock *in* Daget *et al.*, 1986; Njock *in* Quéro *et al.*, 1990), common to 1.5 m (Allen *in* Fischer *et al.*, 1981).

**Interest to Fisheries:** One of the most important fishery (see Table 3; mainly caught by trawl, gill net and beach seine) and sport species on the west coast of Africa.

**Local Names:** ANGOLA: Barbudo; BENIN: Chikoué, Gainfio; CAPE VERDE: Barbo, Barbudo-gigante, Capitão, Peixe-barba; GUINEA: Sori; SENEGAL: Capitaine, Njaane, Njaane jaara.

**Literature:** Allen *in* Fischer *et al.* (1981); Daget and Njock *in* Daget *et al.* (1986); Njock *in* Quéro *et al.* (1990).

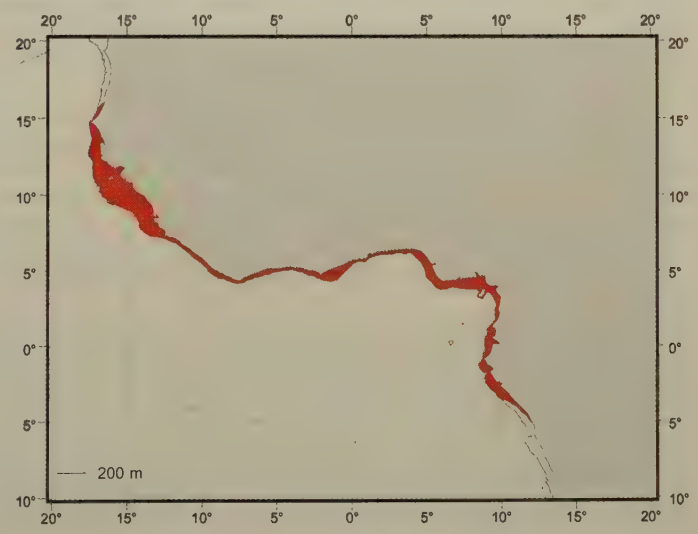



**Fig. 119** ***Polydactylus quadrifilis***
Known distribution

**Remarks:** ***P. quadrifilis*** is easily distinguished from other congeners by having 4 pectoral filaments (5 to 9 in all other congeners).

## *Polydactylus sexfilis* (Valenciennes, 1831)

**Fig. 120; Plate Vb-d**

*Polynemus sexfilis* Valenciennes *in* Cuvier and Valenciennes, 1831: 515 [type locality: Mauritius; lectotype (MNHN 9731, 265 mm standard length) designated by Motomura, Iwatsuki and Kimura, 2001a; 2 paralectotypes (MNHN A. 3027, 96 mm standard length; MNHN 9728, 92 mm standard length)].

**Synonyms:** *Polynemus kuru* Bleeker, 1853b: 600 [type locality: Jakarta, Java, Indonesia; 2 syntypes (RMNH 6006, 87 to 198 mm standard length) determined from 5 Bleeker specimens by Motomura, Iwatsuki and Kimura, 2001a].

**FAO Names: En** - Sixfinger threadfin; **Fr** - Barbure à six doigts; **Sp** - Barbudo de seis dedos.

**Fig. 120** *Polydactylus sexfilis*

**Diagnostic Features:** A medium-sized species. Body depth at first dorsal-fin origin 26 to 32% (mean 29%) of standard length; head length 27 to 34% (mean 32%) of standard length. Snout pointed; occipital profile nearly straight. Posterior margin of maxilla reaching to level of posterior margin of adipose eyelid; upper-jaw length 13 to 15% (mean 15%) of standard length; depth of posterior margin of maxilla less than eye diameter; lip on lower jaw well developed, dentary teeth restricted to dorsal surface; teeth villiform in broad bands on vomer, palatines and ectopterygoids. Posterior margin of preopercle serrated. First dorsal fin with VIII spines, all spine bases of similar thickness; second dorsal fin with I spine and 12 or 13 (mode 13) soft rays; anal fin with III spines and 11 or 12 (mode 11) soft rays, anal-fin base approximately equal to second dorsal-fin base; pectoral fin with 15 or 16 (mode 16) rays, its length 20 to 23% (mean 21%) of standard length, posterior tip not reaching to level of posterior tip of pelvic fin; all pectoral-fin rays unbranched except larger specimens (in larger specimen, third pectoral-fin ray bifurcated at tip, fourth and fifth pectoral-fin rays divided into 3 at tip, and remaining pectoral-fin rays unbranched); pectoral filaments 6; first pectoral filament shortest, not reaching to level of pelvic-fin origin; second to fifth pectoral filaments extending beyond level of pelvic-fin origin; sixth pectoral filament longest, its length 28 to 41% (mean 35%) of standard length, not reaching to or extending beyond level of posterior tip of pelvic fin; caudal fin deeply forked, upper and lower caudal-fin lobes not filamentous, upper caudal-fin lobe 39 to 48% (mean 44%) and lower lobe 37 to 46% (mean 41%) of standard length. Pored lateral-line scales 60 to 67 (mode 64); lateral line simple, extending from upper end of gill opening to upper end of lower caudal-fin lobe; scale rows above lateral line 8 to 10 (mode 9), below 12 to 14 (mode 13). Gillrakers 11 to 14 (mode 13) on upper limb, 15 to 18 (mode 17) on lower limb, 27 to 31 (mode 30) total. Vertebrae 10 precaudal and 14 caudal; supraneural bones 3. Swimbladder present. **Colour:** Upper sides of head and trunk tinged silvery brown, becoming more silver on lower sides; first dorsal fin black; posteriormost ray of second dorsal fin white, remainder of fin greyish black; base of pectoral fin greyish black, becoming dense black posteriorly; bases and tips of pectoral filaments white, middle parts of filaments greyish black; anterior part of pelvic fin greyish black, remainder of fin white; posteriormost ray of anal fin white, remainder of fin greyish black; caudal fin uniformly greyish black; 7 to 9 prominent dark stripes along longitudinal scale rows above lateral line, 1 to 12 faint stripes below (sometimes no stripes, especially in smaller specimens).

**Geographical Distribution:** Widely distributed in the Indo-Pacific region, generally in the vicinity of oceanic islands (Fig. 121). Specimens never collected from the coast of the Australian continent. The species is considered to be less dependent upon large fresh-water rivers (based on known locality data) than other, heavily-dependent polynemid species. Distributional implications of the species in Japanese waters were discussed by Motomura, Burhanuddin and Iwatsuki (2000).

**Habitat and Biology:** Occurs along shallow (less than 50 m), sandy and rocky coastal beaches, in lagoons and near reef areas in the vicinity of oceanic islands, frequently in zones of turbulence. Feeds mainly on crustaceans and teleosts.

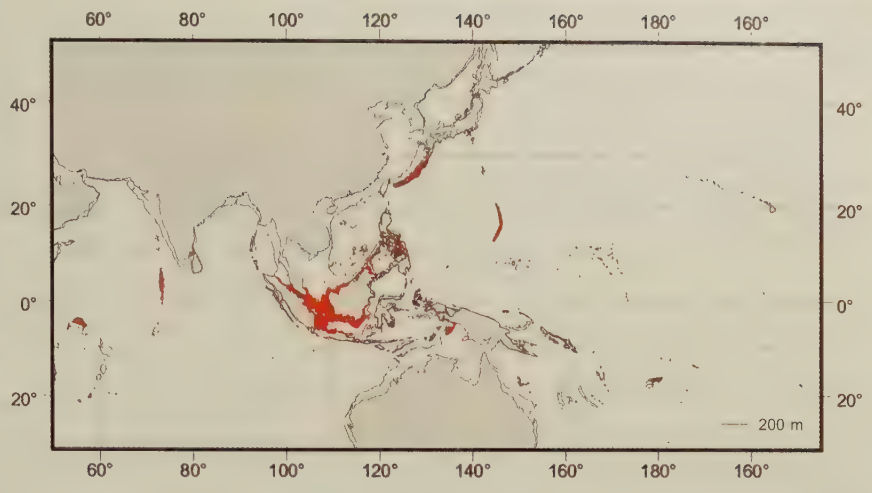



**Fig. 121** ***Polydactylus sexfilis***
Known distribution

Matures first as males at between 20 and 25 cm fork length, subsequently transforming into functional females at between 30 and 40 cm fork length following a hermaphroditic stage (Santerre and May, 1977; May, Akiyama and Santerre, 1979). Displays a lunar spawning rhythm. Observations of spawning behaviour given by May, Akiyama and Santerre (1979). The potential of the species for aquaculture has also been studied (e.g. May, 1976; Ostrowski *et al.*, 1996; Leber, Brennan and Arce, 1998; Masuda and Ziemann, 2000).

**Size:** Maximum standard length at least 45 cm (Motomura and Senou, 2002).

**Interest to Fisheries:** One of the most important commercial and sport fisheries' species in Hawaii, where it is actively cultivated.

**Local Names:** AUSTRALIA: Six-fingered threadfin; BANGLADESH: Dagi, Golden sixthread tesselfish, Topshi; FRENCH POLYNESIA: Moi; HAWAII: Moi, Moili'I, Pacific thread-fin fish, Pacific threadfin; INDONESIA: Mulut tikus; JAPAN: Nan'you-agonashi; MARSHALL ISLANDS: Atkaru, Becadulce; PAPUA NEW GUINEA: Six-fingered threadfin; PITCAIRN: Moi; SAMOA: I'ausi, Umiumia, Umi'umia; SEYCHELLES: Mulet barbe; SOLOMON ISLANDS: Bou na pana, Six-fingered threadfin; SRI LANKA: Gatha, Kala; TAHITI: Moi; TUAMOTO ISLANDS: Moi;

**Literature:** Motomura, Burhanuddin and Iwatsuki (2000); Motomura, Iwatsuki and Kimura (2001a); Motomura and Senou (2002); Motomura (2002).

**Remarks:** ***P. sexfilis*** has usually been regarded as a valid species (e.g. Sauvage, 1891; Munro, 1955; Jones and Kumaran, 1980). Although ***P. kuru*** has also been regarded as a valid species (e.g. Kendall and Goldsborough, 1911; Weber and de Beaufort, 1922; Mishra and Krishnan, 1993), type materials of the 2 have never been directly compared. Recent examination of 2 syntypes of ***Polynemus kuru*** showed them to correspond closely with lectotype and 2 paralectotypes of ***P. sexfilis***. Therefore, ***P. kuru*** is regarded as a junior synonym (Motomura, Iwatsuki and Kimura, 2001a).

Fricke (1999) synonymized ***Polydactylus sexfilis*** with ***P. sextarius***, but his opinion was clearly erroneous. ***Polydactylus sexfilis*** can be easily distinguished from ***P. sextarius*** in lacking a large black spot anteriorly on the lateral line (present in the latter) and possessing villiform teeth in broad bands on the vomer (teeth absent).

Although Munro (1955, 1967) and Menon and Babu Rao *in* Fischer and Bianchi (1984) described the pectoral fin of ***P. sexfilis*** as being black, the fin membrane pigmentation was found to be quite variable (from no pigment to entirely black).

The pectoral-fin rays of ***P. sexfilis*** were thought to remain unbranched throughout life. However, the pectoral fin of a large specimen (KPM-NI 8127, 456 mm standard length, from the Izu Islands, Japan) was found to have 3 branched rays. Although the first, second, and sixth to sixteenth pectoral-fin rays of the specimen were unbranched, the third, and fourth and fifth rays were bifurcated and divided into 3, respectively, near the tips. This change from unbranched to branched fin rays is apparently related to fish growth. Five similar ***Polydactylus*** species: ***P. malagasyensis***, ***P. microstomus***, ***P. mullani***, ***P. persicus*** and ***P. sextarius***, characterized by having a large black spot anteriorly on the lateral line, are also known to have branched pectoral-fin rays. However, the pectoral-fin ray condition in these species differs from that of ***P. sexfilis*** in that all of the rays, except the uppermost 1 or 2, are branched throughout life.

Like ***P. sexfilis*** and 2 other Indo-Pacific ***Polydactylus*** species, such as ***P. longipes*** and ***P. nigripinnis***, are characterized by having 6 pectoral filaments and lacking a large black spot anteriorly on the lateral line. Comparisons of ***P. sexfilis*** with ***P. longipes*** and ***P. nigripinnis*** are given in the accounts of the latter 2 species.

*Polydactylus sexfilis* is most similar to *P. plebeius* in overall body appearance, but differs from the latter in having higher counts of pectoral filaments (6 versus 5 in the latter), lower counts of pectoral-fin rays [15 or 16 (mode 16) versus 16 to 18 (mode 17; rarely 15)] and higher counts of gillrakers [27 to 31 (mode 30) versus 24 to 32 (mode 26)]. Furthermore, *P. sexfilis* tends to have a longer second dorsal-fin ray than *P. plebeius*, although the proportional length measurements for such overlapped between the 2 species [21 to 30% (mean 26%) of standard length versus 19 to 28% (mean 22%) of standard length; see Motomura, Iwatsuki and Kimura, 2001a: fig. 3]. Both anal- and caudal-fin rays of *P. sexfilis* are also slightly longer than those of *P. plebeius* [anal fin: 20 to 26% (mean 23%) of standard length versus 17 to 23% (mean 19%); upper caudal fin: 39 to 48% (mean 44%) versus 33 to 44% (mean 39%); lower caudal fin: 37 to 46% (mean 41%) versus 30 to 41% (mean 36%)].

## *Polydactylus sextarius* (Bloch and Schneider, 1801) — Fig. 122; Plate Ve-f

*Polynemus sextarius* Bloch and Schneider, 1801: 18, pl. 4 [type locality: Tranquebar, Tamil Nadu, India; holotype (ZMB 565, 125 mm standard length)].

**Synonyms:** None.

**FAO Names: En** - Blackspot threadfin; **Fr** - Barbure à tâche noire; **Sp** - Barbudo de mancha negra.

**Fig. 122** *Polydactylus sextarius*

**Diagnostic Features:** A small- to medium-sized species. Body depth at first dorsal-fin origin 29 to 36% (mean 32%) of standard length; head length 30 to 35% (mean 33%) of standard length. Snout pointed; occipital profile nearly straight. Posterior margin of maxilla not reaching to or extending slightly beyond level of posterior margin of adipose eyelid; upper-jaw length 12 to 14% (mean 13%) of standard length; depth of posterior margin of maxilla less than eye diameter; lip on lower jaw well developed, dentary teeth restricted to dorsal surface; teeth villiform in broad bands on palatines and ectopterygoids; vomerine tooth plate covered with skin and teeth absent; palatines inwardly turned anteriorly. Posterior margin of preopercle serrated. First dorsal fin with VIII spines, all spine bases of similar thickness; second dorsal fin with I spine and 12 or 13 (mode 13) soft rays; anal fin with III spines and 11 to 13 (mode 12) soft rays, anal-fin base approximately equal to second dorsal-fin base; pectoral fin with 13 to 15 (mode 14) rays (all rays unbranched, except uppermost 1 or 2), its length 19 to 25% (mean 22%) of standard length, posterior tip not reaching to level of posterior tip of pelvic fin; pectoral filaments 6, first filament shortest; sixth pectoral filament longest, its length 20 to 29% (mean 25%) of standard length, not reaching to level of posterior tip of pectoral fin; caudal fin deeply forked, upper and lower caudal-fin lobes not filamentous, upper caudal-fin lobe 33 to 41% (mean 36%) and lower lobe 31 to 41% (mean 34%) of standard length. Pored lateral-line scales 45 to 51 (mode 46); lateral line simple, extending from upper end of gill opening to upper end of lower caudal-fin lobe; scale rows above lateral line 5 or 6 (mode 6), below 8 to 11 (mode 11). Gillrakers 10 to 14 (mode 12) on upper limb, 14 to 18 (mode 16) on lower limb, 25 to 30 (mode 28) total. Vertebrae 10 precaudal and 14 caudal; supraneural bones 3. Swimbladder atrophied, like a fine string. **Colour:** Head and upper sides of trunk with slightly darkish silver tinge, becoming lighter on lower sides; snout

semi-translucent; posterior margin of first and second dorsal fins and caudal fin slightly blackish, other parts translucent; posterior tip of anal fin whitish, other parts blackish; pectoral-fin membrane white with scattered melanophores; pectoral filaments whitish; anterior parts of pelvic fin slightly yellowish white, other parts whitish; a large black spot anteriorly on lateral line.

**Geographical Distribution:** Known from the eastern Indian to western Pacific oceans where it ranges from southwestern India to Papua New Guinea and Miyazaki, Kyushu Island, Japan (Fig. 123). Although Munro (1967) reported a single example (CSIRO C. 1002, 157 mm standard length) collected from Papua New Guinea, ***P. sextarius*** is considered to occur rarely west of Huxley's line (sensu George *in* Whitmore, 1981). Therefore, it may occur rarely in the Philippines, eastern Indonesia, including the Lesser Sunda Islands, Sulawesi Island, Moluccas and Irian Jaya, and Papua New Guinea.

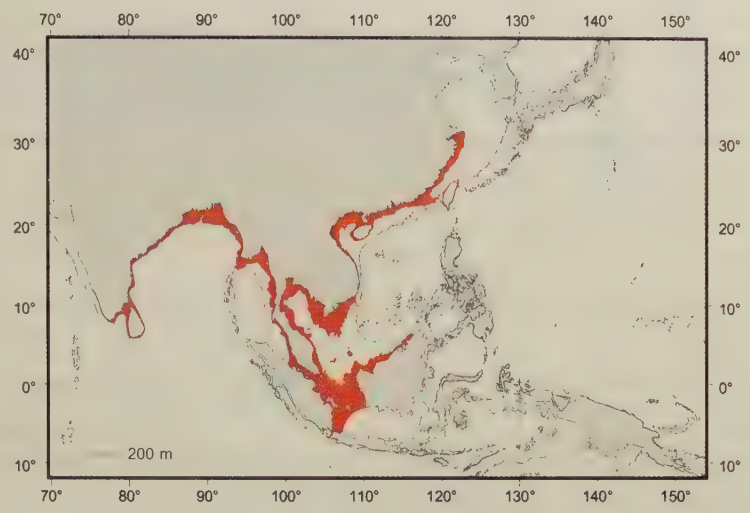



**Fig. 123** ***Polydactylus sextarius***
Known distribution

**Habitat and Biology:** Occurs on sandy and muddy bottoms, being taken from depths of 16 to 73 m. The species feeds mainly on shrimps (less than 20 mm) and amphipods, other important dietary items (in 50% or more of the stomachs) being crabs, mysids, fishes and polychaetes (Hida, 1967).

Hida (1967) reported the sex composition of 140 specimens of ***P. sextarius*** from the Bay of Bengal, India as: 112 hermaphrodites ranging from 50 to 149 mm standard length, 27 mature females ranging from 100 to 105 mm standard length and 1 sex undetermined. The hermaphrodites with relatively large testes were considered as mature males (90 to 134 mm standard length) and those with granulated ova about 0.3 to 0.5 mm diameter as mature female (105 to 149 mm standard length). The species undergoes a protandrous change through a juvenile-hermaphrodite-female progression, first reaching sexual maturity as a functional male hermaphrodite. There is no evidence that females develop directly from juveniles.

**Size:** Maximum standard length at least 17 cm (Motomura and Iwatsuki, 2001b).

**Interest to Fisheries:** An important fishery species, generally caught by trawl in the Bay of Bengal and Thailand.

**Local Names:** INDIA: Blackspot threadfin; JAPAN: Kataguro-agonashi; MALAYSIA: Benong, Gubal, Kurau, Lelaoh tanah, Melong, Mancong, Senangin, Senangin buis, Senohong; MYANMAR: Za yaw; PAPUA NEW GUINEA: Black-spot threadfin; SRI LANKA: Kutlikala.

**Literature:** Motomura *et al.* (1999); Motomura and Iwatsuki (2001b); Motomura (2002).

**Remarks:** Fricke (1999) synonymized ***Polynemus sexfilis*** and ***P. astrolabi*** under ***Polydactylus sextarius***. However, ***Polydactylus*** (= ***Polynemus***) ***sexfilis*** is presently recognized as a valid species (Motomura, Iwatsuki and Kimura, 2001a) and ***P. astrolabi*** was synonymized with ***Galeoides decadactylus*** (Motomura, Iwatsuki and Kimura, 2001b).

Five ***Polydactylus*** species: ***P. malagasyensis***, ***P. microstomus***, ***P. mullani***, ***P. persicus*** and ***P. sextarius***, are characterized by having all pectoral-fin rays branched, except the uppermost 1 or 2, the vomer without teeth and a large black spot anteriorly on the lateral line. ***Polydactylus sextarius*** can be easily distinguished from ***P. microstomus*** and ***P. mullani*** by the number of pectoral filaments [6 versus 5 (rarely asymmetrically 5 and 6) and 7 (rarely asymmetrically 6 and 7), respectively, in the latter]. Comparisons of ***P. sextarius*** with ***P. malagasyensis*** and ***P. persicus*** are given in the accounts of the latter 2 species.

## ***Polydactylus siamensis*** Motomura, Iwatsuki and Yoshino, 2001

**Fig. 124; Plate Vg**

***Polydactylus siamensis*** Motomura, Iwatsuki and Yoshino, 2001: 122, fig. 1B [type locality: northern Gulf of Thailand (purchased at Samyan market, Bangkok); holotype (URM-P 14050, 252 mm standard length); paratype (MUFS 18280, 137 mm standard length)].

**Synonyms:** None.

**FAO Names: En** - Largemouth striped threadfin; **Fr** - Barbure à grande bouche; **Sp** - Barbudo rayado de boca grande.

**Fig. 124** ***Polydactylus siamensis***

**Diagnostic Features:** A medium-sized species. Body depth at first dorsal-fin origin 30 to 33% (mean 32%) of standard length; head length 31 to 34% (mean 32%) of standard length. Snout pointed; occipital profile nearly straight. Posterior margin of maxilla extending slightly beyond level of posterior margin of adipose eyelid; upper-jaw length 16 to 17% (mean 17%) of standard length; depth of posterior margin of maxilla less than eye diameter; lip on lower jaw well developed, dentary teeth restricted to dorsal surface; teeth villiform in broad bands on vomer, palatines and ectopterygoids. Posterior margin of preopercle serrated. First dorsal fin with VIII spines, all spine bases of similar thickness; second dorsal fin with I spine and 12 or 13 (mode 13) soft rays; anal fin with III spines and 11 soft rays, anal-fin base less than second dorsal-fin base; pectoral fin with 15 rays (all rays unbranched), its length 20 to 22% (mean 21%) of standard length, posterior tip not reaching to level of posterior tip of pelvic fin; pectoral filaments 5; first pectoral filament shortest, just short of or reaching to level of pelvic-fin origin; second to fourth pectoral filaments not reaching to level of posterior tip of pelvic fin; fifth pectoral filament longest, its length 31 to 43% (mean 36%) of standard length, reaching to or extending beyond level of posterior tip of pelvic fin; caudal fin deeply forked, upper and lower caudal-fin lobes not filamentous, upper caudal-fin lobe 38 to 41% (mean 40%) and lower lobe 34 to 37% (mean 35%) of standard length. Pored lateral-line scales 54 to 58 (mode 54); lateral line simple, extending from upper end of gill opening to upper end of lower caudal-fin lobe; scale rows above lateral line 7, below 10 or 11 (mode 11). Gillrakers 9 or 10 (mode 10) on upper limb, 13 or 14 (mode 13) on lower limb, 22 to 24 (mode 23) total. Vertebrae 10 precaudal and 14 caudal; supraneural bones 3. Swimbladder absent. **Colour:** 7 or 8 prominent dark stripes along scale rows above lateral line, 7 to 9 faint stripes below.

**Geographical Distribution:** Currently known only from Bangkok, Songkhla and Phuket, Thailand (Fig.125). According to local fishermen at Bangkok, Samut Prakan and Prachuap Khirikhan, Thailand, ***P. siamensis*** rarely occurs in the Gulf of Thailand and the record from the Gulf of Thailand is based only on 3 specimens. The species is mainly distributed in the Andaman Sea.

**Habitat and Biology:** No data are available.

**Size:** Maximum standard length at least 25 cm (Motomura, Iwatsuki and Yoshino, 2001).

**Interest to Fisheries**: None.

**Local Names:** MYANMAR: Za yaw.

**Literature:** Motomura, Iwatsuki and Yoshino (2001); Motomura (2002).

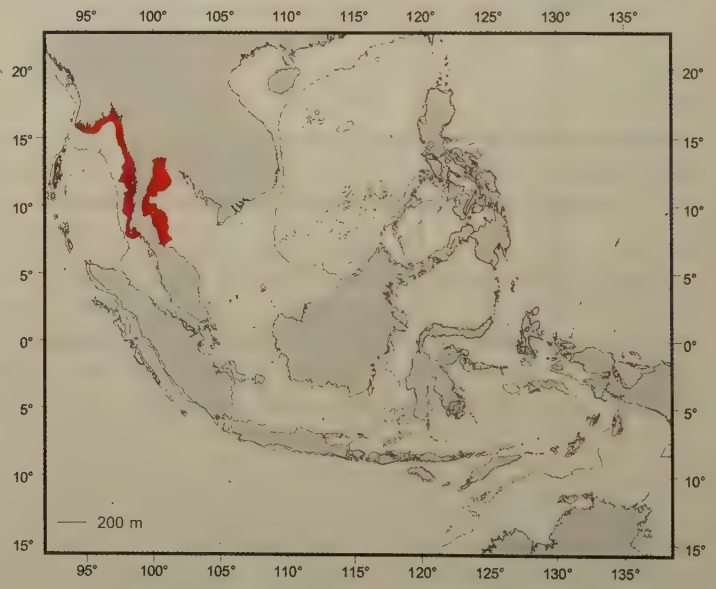



**Fig. 125** ***Polydactylus siamensis***
Known distribution

**Remarks:** ***P. siamensis*** was recently described as a new species by Motomura, Iwatsuki and Yoshino (2001) and characterized by having 5 pectoral filaments, several longitudinal dark stripes along each scale row on the lateral body surface, and lower counts of pectoral-fin rays (15), scales above and below the lateral line [7 and 10 or 11 (mode 11), respectively], pored lateral-line scales [54 to 58 (mode 54)] and gillrakers [9 or 10 (mode 10) upper series, 13 or 14 (mode 13) lower and 22 to 24 (mode 23) total]. Comparisons of ***P. siamensis*** with related species, ***P. bifurcus*** and ***P. plebeius***, are given in the accounts of the latter 2 species.

## *Polydactylus virginicus* (Linnaeus, 1758) Fig. 126; Plate Vh

*Polynemus virginicus* Linnaeus, 1758: 317 (type locality: America; no types known).

**Synonyms:** *Polynemus naso* Walbaum, 1793: 108 (type locality: probably Brazil; no types known). *Polynemus mango* Lacepède, 1803: 411, 413 (type locality: America; no types known). *Polydactylus plumierii* Lacepède, 1803: 419, 420, pl. 14, fig. 3 (type locality: unknown; no types known). *Polynemus americanus* Cuvier 1829a: 155 [type locality: American seas; 3 syntypes (MNHN 5504, 141 mm standard length; MNHN A. 3028, 157 mm standard length; MNHN A. 3031, 121 mm standard length)]. *Polynemus antillarum* Perugia, 1896: 16 [type locality: St. Pierre, Martinique Island, West Indies; holotype (MSNG 6695, 84 mm standard length)].

**FAO Names: En** - Barbu; **Fr** - Barbure de flaque; **Sp** - Barbudo de charco.

**Fig. 126** *Polydactylus virginicus*

**Diagnostic Features:** A medium-sized species. Body depth at first dorsal-fin origin 29 to 32% (mean 30%) of standard length; head length 29 to 34% (mean 32%) of standard length. Snout pointed; occipital profile nearly straight. Posterior margin of maxilla just short of or reaching to level of posterior margin of adipose eyelid; upper-jaw length 13 to 16% (mean 14%) of standard length; depth of posterior margin of maxilla less than eye diameter; lip on lower jaw well developed, dentary teeth restricted to dorsal surface; teeth villiform in broad bands on vomer, palatines and ectopterygoids. Posterior margin of preopercle serrated. First dorsal fin with VIII spines, all spine bases of similar thickness; second dorsal fin with I spine and 11 or 12 (mode 12) soft rays; anal fin with III spines and 11 to 14 (mode 13) soft rays, anal-fin base greater than second dorsal-fin base; pectoral fin with 14 to 16 (mode 15) rays (all rays unbranched), its length 23 to 28% (mean 26%) of standard length, posterior tip not reaching to, just reaching to or extending slightly beyond level of posterior tip of pelvic fin; pectoral filaments 7; first pectoral filament shortest, not reaching to or extending slightly beyond level of pelvic-fin origin; second to fifth pectoral filaments extending beyond level of pelvic-fin origin; sixth pectoral filament just short of or extending beyond level of posterior tip of pelvic fin; seventh pectoral filament longest, its length 36 to 47% (mean 42%) of standard length, extending beyond level of anal-fin origin, sometimes extending beyond level of midpoint of anal-fin base; caudal fin deeply forked, upper and lower caudal-fin lobes not filamentous, upper caudal-fin lobe 35 to 41% (mean 38%) and lower lobe 32 to 41% (mean 36%) of standard length. Pored lateral-line scales 54 to 63 (mode 58); lateral line bifurcated on caudal fin, extending to posterior margins of upper and lower caudal-fin lobes; scale rows above lateral line 6 to 8 (mode 7), below 10 to 12 (mode 11). Gillrakers 26 to 30 (mode 28). Vertebrae 10 precaudal and 14 caudal; supraneural bones 3. Swimbladder present, well developed. **Colour:** Upper sides of head and trunk with slightly darkish silver tinge, becoming lighter on lower sides; snout semi-translucent; margins of second dorsal and caudal fins blackish, other parts translucent; intensity of pigmentation of pectoral and upper parts of first dorsal fin very variable; pectoral filaments, pelvic and anal fins white.

**Geographical Distribution:** In the western Atlantic Ocean, ranging from New Jersey, USA to Salvador, Brazil (Fig. 127). However, the species does not occur in the northern and western Gulf of Mexico.

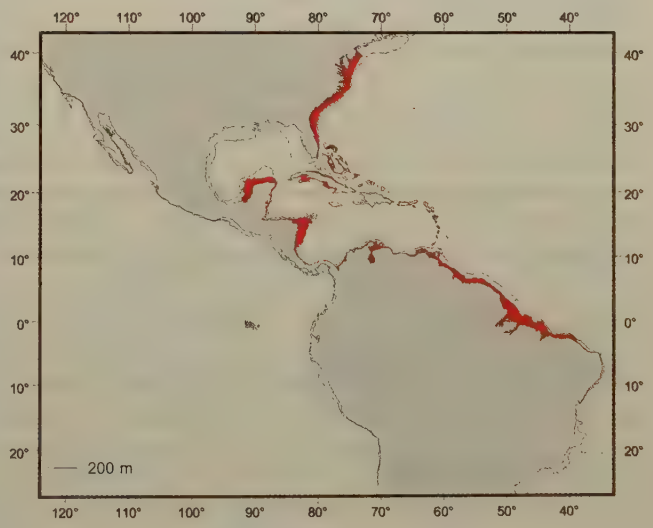



**Fig. 127** *Polydactylus virginicus*
Known distribution

**Habitat and Biology:** Inhabits sandy and muddy bottoms in coastal waters, estuaries and mangroves, as well as sometimes occurring in the surf. A large number of young specimens aggregate in river mouths. The species feeds primarily at night (Austin and Austin, 1971), taking mainly crustaceans, followed by chaetognaths, plant material and polychaetes. It appears to have a prolonged spawning season because juveniles are commonly found throughout the year.

**Size:** Maximum total length 33 cm (Feltes *in* Carpenter, 2002).

**Interest to Fisheries:** Caught incidentally by seines and trawls and is of little commercial importance.

**Local Names:** BARBADOS: Beard fish; BELIZE: Barbú; CUBA: Barbi, Barbu, Barbudo, Catfish; DOMINICA: Barbudo; DOMINICAN REP.: Barbú; GUADELOUPE: Barbi, Barbu argenté, Threadfin; GUYANA: Chinese nose, Threadfin, Threadfish; HAITI: Sevenfingered threadfin; MARTINIQUE: Barbi, Barbu argenté, Threadfin; NICARAGUA: Barbudo de charco; PUERTO RICO: Barbudo, Threadfin; ST. LUCIA: Barbu; SURINAME: Barbu; Sardijntje.

**Literature:** Feltes *in* Carpenter (2003).

**Remarks:** ***Polydactylus virginicus***, the most common species in the western Atlantic, has been regarded as a senior synonym of ***Polydactylus plumierii***, ***Polynemus americanus*** and ***P. mango*** (see Eschmeyer, 1998). The holotype (MSNG 6695, 84 mm standard length) of ***Polynemus antillarum*** is also conspecific with specimens considered here as ***Polydactylus virginicus***, the former herein being regarded as a junior synonym of the latter.

***Polynemus naso*** was originally described by Walbaum (1793) as a species locally named "Piracoada", which occurred off the Atlantic coast of Brazil. Although Eschmeyer (1998) believed that the species does not belong to the family Polynemidae, Walbaum (1793) stated that ***P. naso*** is characterized by having 6 pectoral filaments and a cartilaginous snout, which are included in the diagnostic characteristics of the family. Therefore, ***P. naso*** clearly belongs to the family Polynemidae. Two polynemids, ***Polydactylus oligodon*** and ***P. virginicus***, are also known to occur in Brazil (type locality of ***Polynemus naso***). Because ***Polydactylus virginicus*** is more common than ***P. oligodon*** and occasionally has 6 pectoral filaments (as has ***P. plumierii***), ***Polynemus naso*** is herein treated as a likely junior synonym of ***Polydactylus virginicus***. However, ***Polynemus naso*** has at no time been reported during the 200 years following its original description. Therefore, if ***P. naso*** is a different species from ***Polydactylus virginicus*** and an earlier name of some other polynemid, the former cannot become a valid taxon under the Reversal of Precedence (treated as *nomen oblitum*; Article 23.9, ICZN-1999).

***Polydactylus virginicus*** and 2 other species, ***P. octonemus*** and ***P. oligodon***, occur in the western Atlantic, being very similar to each other in overall body appearance. Comparisons of ***P. virginicus*** with ***P. octonemus*** and ***P. oligodon*** are given in the accounts of the latter 2 species.

## ***Polynemus*** Linnaeus, 1758

***Polynemus*** Linnaeus, 1758: 317 (type species: ***Polynemus paradiseus*** Linnaeus, 1758, see Opinion 93, ICZN-1926).

**Synonyms:** ***Polistonemus*** Gill, 1861: 277 (type species: ***Polynemus multifilis*** Temminck and Schlegel, 1843).

**Diagnostic Features:** Body and head elongate. Adipose eyelid poorly developed; eye diameter less than snout length. Lip on lower jaw well developed, dentary teeth restricted to dorsal surface; width of tooth band on upper and lower jaws greater than space (on symphysis) separating tooth bands on opposing premaxillae; teeth villiform in broad bands on jaws, palatines and ectopterygoids, vomerine tooth plate without teeth in some species. Posterior margin of maxilla extending well beyond level of posterior margin of adipose eyelid. Posterior margin of preopercle serrated. Basisphenoid absent; sphenotics not visible dorsally between anterior margins of parietal and pterotic. First dorsal fin with VII or VIII spines; second dorsal fin with I spine and 13 to 18 soft rays; anal fin with II or III spines and 10 to 14 soft rays; anal-fin base less than head length; pectoral fin with 14 to 19 rays, all unbranched; pectoral-fin insertion near midline of body; pectoral-fin base (including base of pectoral filaments) less than upper-jaw length; pectoral filaments 7 to 16, extending beyond level of posterior tip of caudal fin; caudal fin deeply forked, but upper and lower caudal-fin lobes not filamentous. Pored lateral-line scales 66 to 109; scale rows above lateral line 6 to 12, below 10 to 22. Total gillrakers 23 to 34. Vertebrae 10 precaudal and 15 caudal; supraneural bones 2. Swimbladder present or absent.

**Habitat and Biology:** ***Polynemus*** species are generally found on sandy or muddy bottoms in fresh-water rivers, estuaries and coastal waters, being more heavily dependent upon a fresh-water habitat than other genera. With the exception of ***P. paradiseus***, no biological information for members of the genus has been reported, owing to the confusion surrounding specific identifications. Information on ***P. paradiseus*** is given below under the species' account.

**Geographic Distribution:** Indo-West Pacific, ranging over continental shelves from western India to southern Viet Nam, including Southeast Asian countries, but has at no time been recorded from the Philippines or Papua New Guinea.

**Interest to Fisheries:** Important commercial fishes in South Asia and Southeast Asia, especially in India, Thailand and Viet Nam. Some species have been exported to Japan as aquarium fishes.

**Species:** The genus comprises 8 species:

***Polynemus aquilonaris***: Thailand, Cambodia, Viet Nam and Lao People's Democratic Republic.

***Polynemus dubius***: Malaysia and Indonesia.

***Polynemus hornadayi***: Sarawak, Malaysia.

***Polynemus kapuasensis***: Kapuas River, Kalimantan

***Polynemus melanochir dulcis***: Lake Tonle Sap, Cambodia.

***Polynemus melanochir melanochir***: Lower Mekong River and related rivers, and Kalimantan.

***Polynemus multifilis***: Thailand and Indonesia.

***Polynemus paradiseus***: India to Thailand.

**Remarks:** ***Polynemus***, which is the oldest available generic name for the family Polynemidae, was originally described by Linnaeus (1758), who simultaneously included 3 species, ***P. paradiseus***, ***P. quinquarius*** and ***P. virginicus***, in the genus. ***Polynemus paradiseus*** was later established as the type species of ***Polynemus*** by ICZN (1926). ***Polynemus quinquarius*** and ***P. virginicus*** are presently regarded as members of ***Pentanemus*** and ***Polydactylus***, respectively.

***Polistonemus*** was originally proposed for ***Polynemus multifilis*** by Gill (1861), but characters of the former are identical with ***Polynemus*** in all respects, except for an increased number of pectoral filaments. Accordingly, ***Polistonemus*** is considered a junior synonym of ***Polynemus*** (e.g. Roberts, 1989).

***Polynemus*** and ***Parapolynemus*** are characterized by the following characters: eye diameter 1.3 or more in snout length (1.3 or less in other genera); pectoral-fin insertion near midline of body (well below midline of body); pectoral filaments longer than standard length (shorter than standard length in other genera, except in ***Pentanemus*** and ***Polydactylus macrophthalmus***). ***Polynemus*** differs from ***Parapolynemus*** in having the posterior margin of the preopercle serrated (largely not serrated in the latter), higher counts of caudal procurrent rays (15 to 19 versus 12 to 14) and pectoral-filament length greater than 1.5 total length (less than 1.5 total length). Further detailed comparisons of the 2 genera were given by Feltes (1993).

## Key to the Species of *Polynemus*

**1a.** Pectoral filaments 13 or more . . . . . → *2*

**1b.** Pectoral filaments 7 . . . . . → *3*

**2a.** Pectoral filaments usually 15 on each side of body; pored lateral-line scales 100 to 110 (mode 103); scale rows above lateral line 9 to 11 (mode 10), below 17 to 20 (mode 18); posterior tip of pectoral fin not extending beyond level of anal-fin origin in adults (Fig. 128, Plate VId) . . . . . ***Polynemus kapuasensis*** (Kapuas river, Kalimantan)

**2b.** Pectoral filaments usually 14 of each side of body; pored lateral-line scales 83 to 99 (mode 86); scale rows above lateral line 7 or 8 (mode 8), below 14 to 18 (mode 15); posterior tip of pectoral fin reaching or extending beyond level of anal-fin origin throughout life (Fig. 129, Plate VIg) . . . . . ***Polynemus multifilis*** (Thailand and Indonesia)

**3a.** First dorsal-fin spines VII; anal-fin spines II or III . . . . . → *4*

**3b.** First dorsal-fin spines VIII (first spine minute); anal-fin spines III . . . . . → *5*

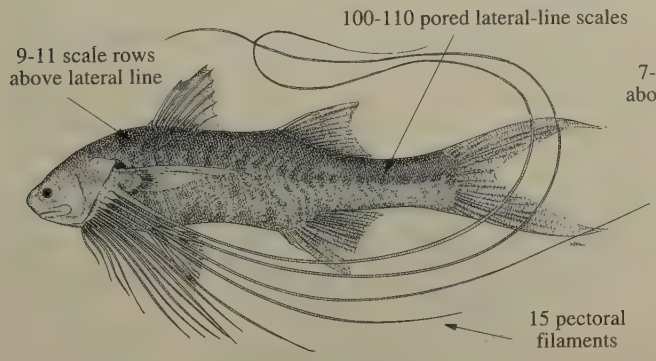



**Fig. 128** ***Polynemus kapuasensis***

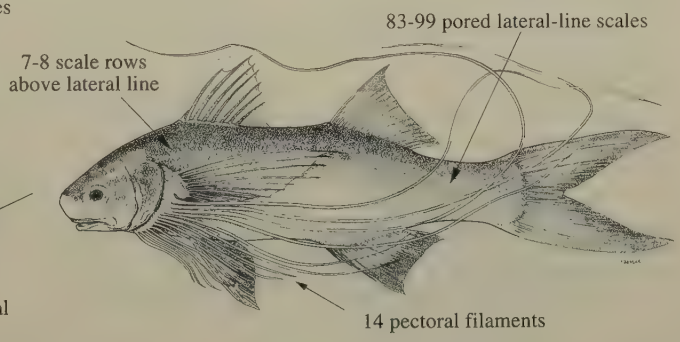



**Fig. 129** ***Polynemus multifilis***

**4a.** Pored lateral-line scales 90 to 103 (mode 94); scale rows above lateral line 8 to 12 (mode 11), below 16 to 21 (mode 18); gillrakers 26 to 28 (mode 26); occipital profile strongly concave; swimbladder present, well developed (Fig. 130, Plate VIc) . . . . . ***Polynemus hornadayi***
(Sarawak, Malaysia)

**4b.** Pored lateral-line scales 66 to 71 (mode 70); scale rows above lateral line 6 or 7 (mode 7), below 10 to 12 (mode 11); gillrakers 30 to 34 (mode 32 or 33); occipital profile nearly straight; swimbladder absent (Fig. 131, Plate VIh) . . . . . ***Polynemus paradiseus***
(India to Thailand)

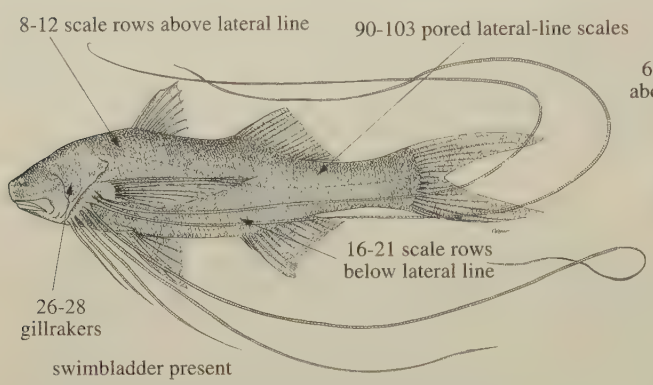

8-12 scale rows above lateral line
90-103 pored lateral-line scales
16-21 scale rows below lateral line
26-28 gillrakers
swimbladder present

**Fig. 130** ***Polynemus hornadayi***

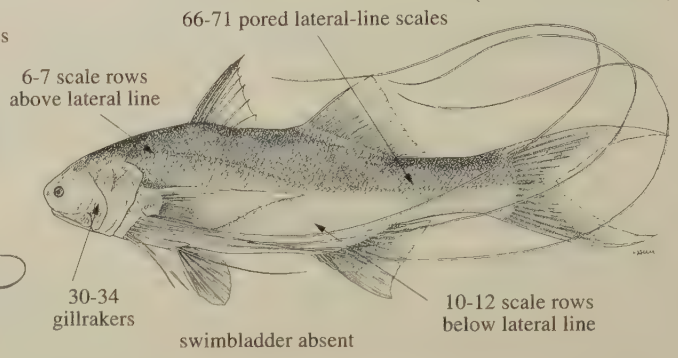

66-71 pored lateral-line scales
6-7 scale rows above lateral line
30-34 gillrakers
swimbladder absent
10-12 scale rows below lateral line

**Fig. 131** ***Polynemus paradiseus***

**5a.** Vomer with teeth; pectoral fin usually not black . . . . . → ***6***

**5b.** Vomer without teeth; pectoral fin usually black . . . . . → ***7***

**6a.** Pored lateral-line scales 80 to 86 (mode 81); scale rows below lateral line 14 to 16 (mode 14, rarely 13 or 17); gillrakers 25 to 29 (mode 27) (Fig. 132, Plate VIa) . . . . . ***Polynemus aquilonaris***
(Thailand, Cambodia, Viet Nam and Lao People's Democratic Republic)

**6b.** Pored lateral-line scales 69 to 79 (mode 78); scale rows below lateral line 13 (rarely 12); gillrakers 29 to 33 (mode 30) (Fig. 133, Plate VIb) . . . . . ***Polynemus dubius***
(Malaysia and Indonesia)

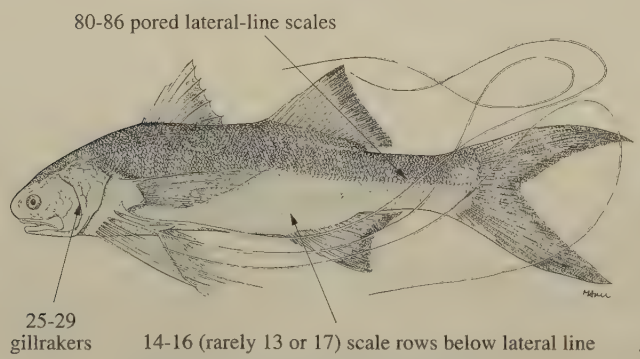



**Fig. 132** ***Polynemus aquilonaris***

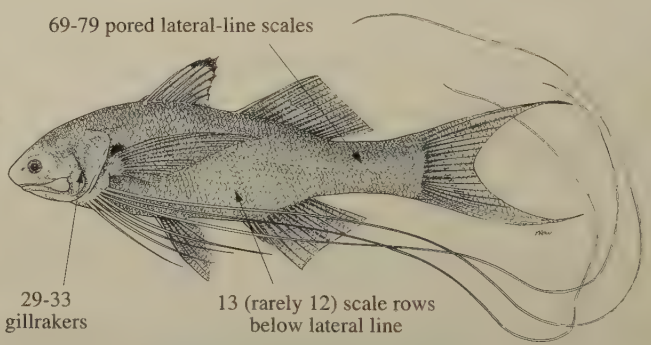



**Fig. 133** ***Polynemus dubius***

**7a.** Snout length 7% of standard length; upper caudal-fin lobe length 34 to 35% (mean 35%) of standard length; seventh pectoral filament longest (Fig. 134; Plate VIe) . . . . . ***Polynemus melanochir dulcis***
(Lake Tonle Sap, Cambodia)

**7b.** Snout length 5 to 6% (mean 6%) of standard length; upper caudal-fin lobe length 35 to 44% (mean 39%) of standard length; sixth pectoral filament usually longest (Fig. 135; Plate VIf) . . ***Polynemus melanochir melanochir***
(lower Mekong River and related rivers, and Kalimantan)

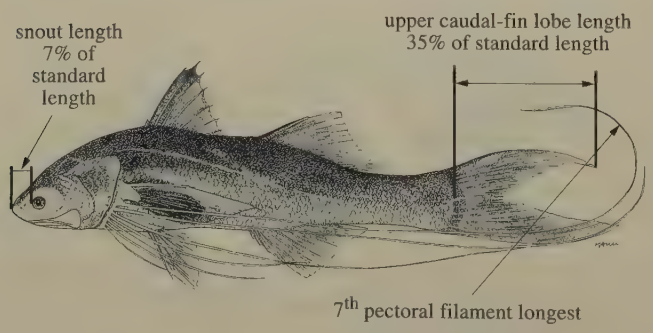



**Fig. 134** ***Polynemus melanochir dulcis***

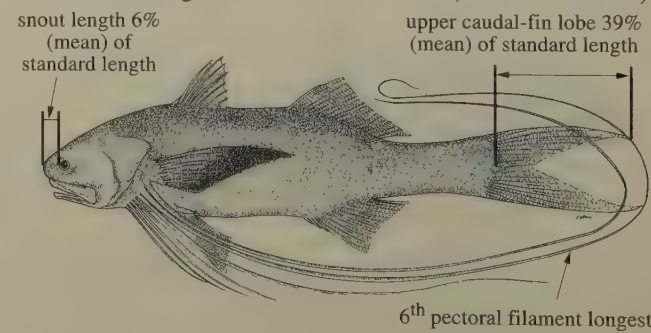



**Fig. 135** ***Polynemus melanochir melanochir***

## *Polynemus aquilonaris* Motomura, 2003

**Fig. 136; Plate VIa**

***Polynemus aquilonaris*** Motomura, 2003a: 155, figs 1a-b, 3 [type locality: Chao Phraya River, Thailand; holotype (URM-P 13930, 136 mm standard length); 12 paratypes (ANSP 177982, 108 mm standard length; ANSP 177984, 2 specimens, 88 to 96 mm standard length; CAS 92821, 114 mm standard length; NRM 24267, 104 mm standard length; UMMZ 181145, 3 specimens, 132 to 139 mm standard length; UMMZ 195407, 105 mm standard length; UMMZ 224815, 64 mm standard length; UMMZ 232331, 2 specimens, 138 to 145 mm standard length)].

**Synonyms:** None.

**FAO Names: En** - Northern paradise fish; **Fr** - Barbure paradis du nord; **Sp** - Barbudo paraíso norteño.

**Fig. 136** ***Polynemus aquilonaris***

**Diagnostic Features:** A medium-sized species. Body depth at first dorsal-fin origin 23 to 26% (mean 25%) of standard length; head length 24 to 29% (mean 26%) of standard length. Snout pointed; occipital profile nearly straight. Posterior margin of maxilla extending well beyond level of posterior margin of adipose eyelid; upper-jaw length 10 to 12% (mean 11%) of standard length, approximately equal to caudal-peduncle depth [10 to 12% (mean 11%) of standard length]; depth of posterior margin of maxilla [2 to 3% (mean 3%) of standard length] slightly less than eye diameter [3 to 4% (mean 3%) of standard length]; lip on lower jaw well developed, dentary teeth restricted to dorsal surface; teeth villiform in broad bands on vomer, palatines and ectopterygoids. Posterior margin of preopercle serrated. First dorsal fin with VIII spines, all spine bases of similar thickness; second dorsal fin with I spine and 15 to 19 (mode 16) soft rays; anal fin with III spines and 11 to 13 (mode 12) soft rays, anal-fin base less than second dorsal-fin base; pectoral fin with 15 to 17 (mode 16) rays (all rays unbranched), its length 34 to 41% (mean 37%) of standard length, posterior tip just short of or extending slightly beyond level of anal-fin origin; pectoral filaments 7; first pectoral filament shortest, not reaching to level of posterior tip of pelvic fin; second pectoral filament extending slightly beyond or not reaching to level of posterior tip of pelvic fin; third pectoral filament extending beyond (rarely just short of) level of posterior tip of pelvic fin; fourth pectoral filament extending beyond level of anal-fin origin or level of posterior base of anal fin; fifth pectoral filament extending beyond level of posterior tips of caudal-fin lobes; sixth, usually longest, its length 260 to 371% (mean 308%) of standard length, and seventh pectoral filaments longer than other filaments, extending well beyond posterior tips of caudal-fin lobes; caudal fin deeply forked, upper and lower caudal-fin lobes not filamentous, upper caudal-fin lobe 39 to 44% (mean 43%) and lower lobe 33 to 41% (mean 38%) of standard length. Pored lateral-line scales 80 to 86 (mode 81); lateral line simple, extending from upper end of gill opening to mid-distal margin of caudal-fin membrane; scale rows above lateral line 6 to 8 (mode 7), below 13 to 17 (mode 14). Gillrakers 9 to 11 (mode 10) on upper limb, 16 to 18 (mode 17) on lower limb, 25 to 29 (mode 27) total. Vertebrae 10 precaudal and 15 caudal; supraneural bones 2. Swimbladder not apparent or present (varying in size less than about 23% of standard length).
**Colour:** Head and body greyish silver dorsally, silver ventrally; anterior margin of first dorsal fin and posterior margin of second dorsal fin blackish, remaining parts translucent; pectoral fin translucent; base of pectoral filaments white, becoming blackish on posterior tips; base and posterior margin of pelvic fin white, remaining parts translucent; posterior margin of anal fin translucent, remaining parts white; posterior margin of caudal fin translucent, remaining parts white.

**Geographical Distribution:** Currently known from the Chao Phraya River system (Thailand), Mekong River system below the Khone waterfalls of Lao People's Democratic Republic (Cambodia, southernmost of Lao People's Democratic Republic and southern Viet Nam), and Lake Tonle Sap and related rivers (Cambodia) (Fig. 137). Two specimens (NSMT-P 21772, 21776, 133 to 138 mm standard length), collected from the Chao Phraya River at Nakhon Sawan, Thailand, represent the northernmost reliable record of the species.

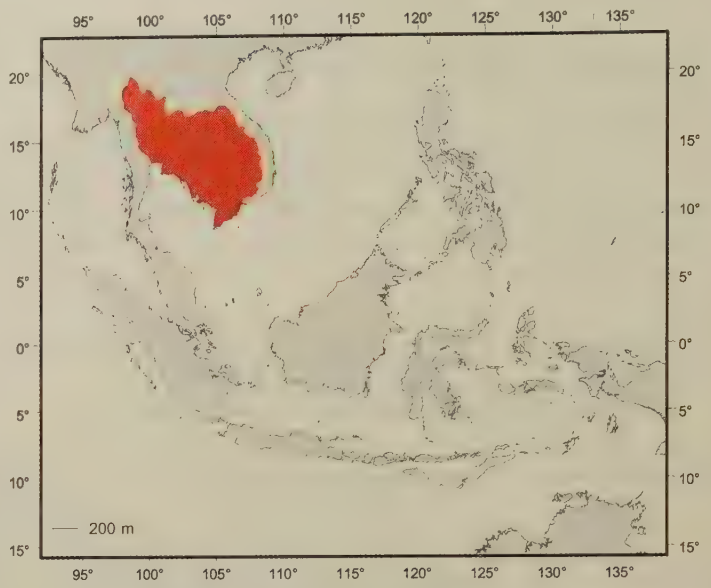



**Fig. 137** ***Polynemus aquilonaris***
Known distribution

***Polynemus aquilonaris*** is currently known from Indochina, whereas a related species, ***P. dubius***, is distributed in rivers on the Malay Peninsula, Sumatra and Kalimantan. The distributions of both species are most likely to be as relics, and are consistent with the location of Sundaland during the last Pleistocene glacial period. According to Bornbusch and Lundberg (1989), Sundaland was drained by several major river systems, at least 2 of which may have participated in faunal mixing. These included the South Indo-China River and North Sunda River which are now restricted to drainages on Indochina, and Malay Peninsula, Sumatra and Kalimantan, respectively, following submergence of Sundaland owing to increased sea levels. The present distributional ranges of ***P. aquilonaris*** and ***P. dubius*** indicate that they evidently originated in the South Indo-China and North Sunda rivers, respectively.

**Habitat and Biology:** Occurs on sandy or muddy bottoms in fresh-water rivers and estuaries. The species feeds on crustaceans, small fishes and benthic organisms. Gonad examinations (based on 12 specimens) of the species by the author revealed that the species should be considered as probably having separate sexes (hermaphroditism not present).

**Size:** Maximum standard length at least 16 cm (Motomura, 2003a).

**Interest to Fisheries:** Esteemed as a food fish at least along the Chao Phraya and Mekong rivers, and Lake Tonle Sap. The species has been often exported to Japan as an aquarium fish.

**Local Names:** CAMBODIA: Trey pream sor; LAO PEOPLE'S DEMOCRATIC REPUBLIC: Jin.

**Literature:** Motomura (2003a).

**Remarks:** ***Polynemus aquilonaris*** previously identified as ***P. dubius*** or ***P. longipectoralis*** (e.g. Rainboth, 1996; Kottelat, 2001), has recently been described as a new species by Motomura (2003a).

Larger specimens (over about 110 mm standard length) of ***Polynemus aquilonaris*** collected from Lake Tonle Sap had a fleshy lip on the upper jaw, smaller specimens (less than about 100 mm standard length) from the lake and all those from other localities having a relatively thin lip. Apart from the lip condition in larger specimens, however, the 2 forms were difficult to distinguish between because their meristic characters and proportional measurements fully overlapped. Therefore, the difference in lip condition between the 2 forms is considered to represent geographical variation. More studies of the 2 forms of ***P. aquilonaris*** are needed to assess whether the 2 represent separate subspecies like ***P. melanochir dulcis*** and ***P. m. melanochir*** or not.

Although ***P. aquilonaris*** is very similar to ***P. dubius***, the former can be clearly distinguished from the latter by having higher counts of pored lateral-line scales [80 to 86 (mode 81) versus 69 to 79 (mode 78) in ***P. dubius***] and scale rows below the lateral line [14 to 17 (mode 14, rarely 13 or 17) versus 13 (rarely 12) in ***P. dubius***], and lower counts of gillrakers [9 to 11 (mode 11) in upper series, 16 to 18 (mode 17) in lower and 25 to 29 (mode 27) total versus 11 to 13 (mode 12), 18 to 21 (mode 18) and 29 to 33 (mode 30), respectively]. Furthermore, ***P. aquilonaris*** differs from ***P. dubius*** in having a slightly higher second dorsal-fin soft ray counts (15 to 19 versus 14 to 16 in ***P. dubius***) and lower pectoral-fin ray counts (15 to 17 versus 16 to 18).

## ***Polynemus dubius*** Bleeker, 1854

**Fig. 138; Plate VIb**

***Polynemus dubius*** Bleeker, 1854: 92 [type locality: Banjarmasin, Sampit or Palembang, Indonesia; lectotype (RMNH 6014, 126 mm standard length) designated by Motomura, 2003a; 7 paralectotypes (RMNH 34452, 77 to 132 mm standard length)].

**Synonyms:** ***Polynemus longipectoralis*** Weber and de Beaufort, 1922: 213 [type locality: Banjarmasin, Kalimantan, Indonesia; holotype (ZMA 112570, 133 mm standard length)].

**FAO Names: En** - Eastern paradise fish; **Fr** - Barbure paradis d'Orient; **Sp** - Barbudo paraíso oriental.

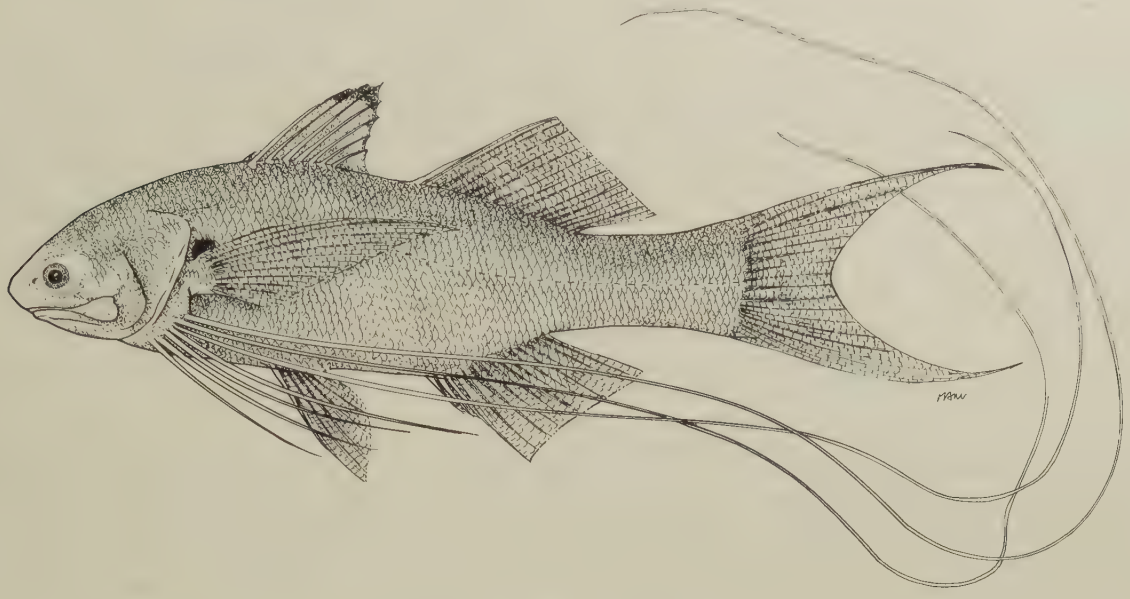


**Fig. 138** ***Polynemus dubius***

**Diagnostic Features:** A medium-sized species. Body depth at first dorsal-fin origin 23 to 28% (mean 24%) of standard length; head length 25 to 27% (mean 26%) of standard length. Snout pointed; occipital profile nearly straight. Posterior margin of maxilla extending well beyond level of posterior margin of adipose eyelid; upper-jaw length 11 to 13% (mean 11%) of standard length, approximately equal to caudal-peduncle depth [11 to 13% (mean 11%) of standard length]; depth of posterior margin of maxilla [3 to 4% (mean 3%) of standard length] slightly greater than eye diameter [2 to 3% (mean 3%) of standard length]; lip on lower jaw well developed, dentary teeth restricted to dorsal surface; teeth villiform in broad bands on vomer, palatines and ectopterygoids. Posterior margin of preopercle serrated. First dorsal fin with VIII spines, all spine bases of similar thickness; second dorsal fin with I spine and 14 to 16 (mode 16) soft rays; anal fin with III spines and 12 soft rays, anal-fin base less than second dorsal-fin base; pectoral fin with 16 to 18 (mode 16) rays (all rays unbranched), its length 30 to 40% (mean 37%) of standard length, posterior tip just short of or extending slightly beyond level of anal-fin origin; pectoral filaments 7; first pectoral filament shortest, not reaching to level of posterior tip of pelvic fin; second pectoral filament extending slightly beyond or not reaching to level of posterior tip of pelvic fin; third pectoral filament extending beyond (rarely just short of) level of posterior tip of pelvic fin; fourth pectoral filament extending beyond level of anal-fin origin or level of posterior base of anal fin; fifth pectoral filament extending beyond level of posterior tips of caudal-fin lobes; sixth, usually longest, its length 264 to 312% (mean 293%) of standard length, and seventh pectoral filaments longer than other filaments, extending well beyond posterior tips of caudal-fin lobes; caudal fin deeply forked, upper and lower caudal-fin lobes not filamentous, upper caudal-fin lobe 35 to 50% (mean 42%) and lower lobe 33 to 47% (mean 39%) of standard length. Pored lateral-line scales 69 to 79 (mode 78); lateral line simple, extending from upper end of gill opening to mid-distal margin of caudal-fin membrane; scale rows above lateral line 6 to 8 (mode 7), below 12 or 13 (mode 13). Gillrakers 11 to 13 (mode 12) on upper limb, 18 to 21 (mode 18) on lower limb, 29 to 33 (mode 30) total. Vertebrae 10 precaudal and 15 caudal; supraneural bones 2. Swimbladder not apparent. **Colour:** (preserved specimens) Head and body grey dorsally, pale silver ventrally; anterior margin and posterior tip of first dorsal fin blackish, remaining parts yellowish silver; posterior margins of second dorsal, anal and caudal fins translucent, remaining parts pale yellow; pectoral fin and filaments translucent or white without melanophores; pelvic fin pale yellow.

**Geographical Distribution:** Currently known from the Kangsar and Muar rivers (western Malaysia in Malay Peninsula), Musi and Batanghari rivers (southeastern Sumatra, Indonesia), and Sampit and Barito rivers (southern Kalimantan, Indonesia) (Fig. 139).

**Habitat and Biology:** Occurs on sandy or muddy bottoms in fresh-water rivers and estuaries. Feeds on crustaceans, small fishes and benthic organisms.

**Size:** Maximum standard length at least 18 cm (Motomura, 2003a).

**Interest to Fisheries:** Unknown.

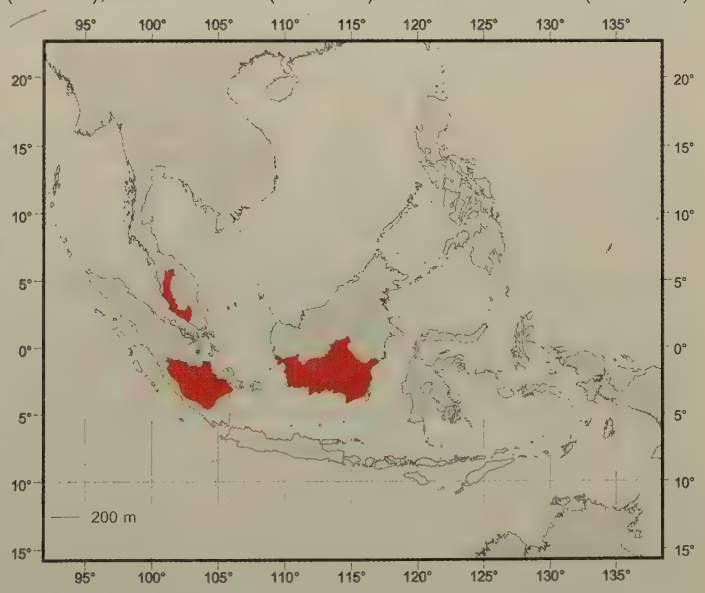



**Fig. 139** ***Polynemus dubius***
Known distribution

**Local Names:** None known.

**Literature:** Motomura (2003a).

**Remarks:** ***P. dubius*** was described by Bleeker (1854) on the basis of Bleeker's (1851a, 1852) descriptions of a species originally believed by him to represent ***P. longifilis*** (true ***P. longifilis*** Cuvier *in* Cuvier and Valenciennes, 1829b has recently been regarded as a junior synonym of ***P. paradiseus***; see Motomura *et al.*, 2002b). Although ***P. dubius*** has been regarded as a valid species (e.g. Kottelat *et al.*, 1993; Randall and Lim, 2000), ***P. longipectoralis*** has also been regarded as a valid species by many researchers (e.g. Chevey, 1932; Kottelat, 1989, 2001; Talwar and Jhingran, 1991; Mishra and Krishnan, 1993), but without comparisons of each nominal species. Weber and de Beaufort (1922), Myers (1936) and Rainboth (1996) regarded both species as valid, the first-mentioned believing ***P. dubius*** and their new species, ***P. longipectoralis***, to be distinguished by the number of lateral-line scales [stated as 67 in ***P. dubius*** (based on a single specimen) versus 84 in ***P. longipectoralis*** (based on the holotype), but in fact 79, according to examination of that specimen by the author]. The diagnostic characters (seven pectoral filaments, 8 spines in the first dorsal fin, 79 pored lateral-line scales, 13 scale rows below lateral line, vomer with villiform teeth and posterior portion of the maxilla less than orbit diameter) found in the holotype of ***P. longipectoralis*** are consistent with those of specimens of ***P. dubius***. Therefore, ***P. longipectoralis*** is regarded as a junior synonym.

Rainboth (1996) also distinguished between the 2 nominal species by the number of lateral-line scales (65-67 in ***P. dubius*** versus 80-85 in ***P. longipectoralis***). However, his ***P. longipectoralis*** is in fact ***P. aquilonaris*** (see account of ***P. aquilonaris***). Myers (1936) distinguished the 2 nominal species by the number of first dorsal-fin spines (7 in ***P. dubius*** versus 8 in ***P. longipectoralis***). However, ***P. dubius***, including the holotype of ***P. longipectoralis***, in fact has 8 spines in the first dorsal fin. ***Polynemus hornadayi*** and ***P. paradiseus*** are the only polynemid species with 7 spines in the first dorsal fin.

***Polynemus dubius*** is easily distinguished from ***P. kapuasensis*** and ***P. multifilis*** by having 7 pectoral filaments (13 to 16 in the latter). ***Polynemus melanochir dulcis*** and ***P. m. melanochir*** lack villiform teeth on the vomer and have black pigmentation on (usually) more than half of the posterior margin of the pectoral fins, whereas ***P. dubius*** has villiform vomerine teeth and lacks black pigmentation on the pectoral fins. Furthermore, ***P. dubius*** differs from both of the above subspecies in having longer pectoral-fin rays [34 to 40% (mean 37%) of standard length in ***P. dubius*** versus 31 to 35% (mean 33%) in ***P. m. dulcis*** and 30 to 35% (mean 32%) in ***P. m. melanochir***] and pectoral filaments [longest filament 264 to 312% (mean 293%) of standard length in ***P. dubius*** versus 128 to 153% (mean 141%) and 141 to 193% (mean 159%), respectively]. Comparisons of ***P. dubius*** with ***P. aquilonaris*** are given in the account of the latter.

## ***Polynemus hornadayi*** Myers, 1936 — **Fig. 140; Plate VIc**

***Polynemus hornadayi*** Myers, 1936: 376, fig. 1 [type locality: Ensengi River (emptying into the Sadong River), Sarawak, Kalimantan, Malaysia; holotype (USNM 100632, 193 mm standard length); 9 paratypes presently known (BMNH 1935.8.29.31, 142 mm standard length; USNM 35719, 8 specimens, 109 to 146 mm standard length)].

**Synonyms:** None.

**FAO Names: En** - Hornaday's paradise fish; **Fr** - Barbure paradis de Hornaday; **Sp** - Barbudo paraíso de Hornaday.

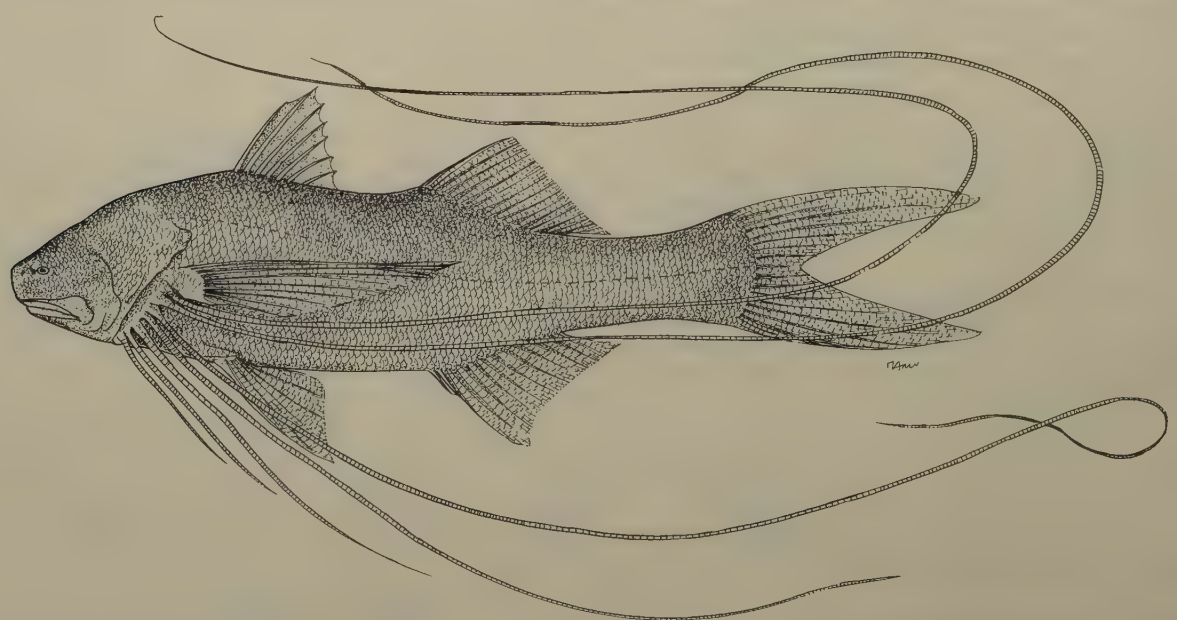


**Fig. 140** ***Polynemus hornadayi***

**Diagnostic Features:** A medium-sized species. Body depth at first dorsal-fin origin 24 to 30% (mean 26%) of standard length; head length 26 to 29% (mean 28%) of standard length. Snout pointed; occipital profile strongly concave. Posterior margin of maxilla extending well beyond level of posterior margin of adipose eyelid; upper-jaw length 13 to 16% (mean 14%) of standard length, greater than caudal-peduncle depth [10 to 11% (mean 11%) of standard length]; depth of posterior margin of maxilla [4 to 5% (mean 5%) of standard length] greater than eye diameter [1 to 2% (mean 1%) of standard length]; lip on lower jaw well developed, dentary teeth restricted to dorsal surface; teeth villiform in broad bands on vomer, palatines and ectopterygoids. Posterior margin of preopercle serrated. First dorsal fin with VII spines, all spine bases of similar thickness; second dorsal fin with I spine and 14 to 16 (mode 15) soft rays; anal fin with II or III (mode III; first of 3 spines vestigial, confirmed by radiograph) spines and 11 or 12 (mode 11) soft rays, anal-fin base less than second dorsal-fin base; pectoral fin with 16 to 19 (mode 18) rays (all rays unbranched), its length 39 to 47% (mean 42%) of standard length, posterior tip reaching to level of midpoint of anal-fin base; pectoral filaments 7; first pectoral filament shortest, not reaching to level of posterior tip of pelvic fin; second pectoral filament not reaching to level of anal-fin origin; third pectoral filament reaching to near level of posterior end of anal-fin base or reaching between levels of origin and posterior end of anal-fin base; fourth pectoral filament slightly longer or slightly shorter than standard length; fifth to seventh pectoral filaments longer than total length; fifth pectoral filament longest, its length 323 to 339% (mean 331%) of standard length; caudal fin deeply forked, upper and lower caudal-fin lobes not filamentous, upper caudal-fin lobe 41 to 46% (mean 44%) and lower lobe 37 to 46% (mean 41%) of standard length. Pored lateral-line scales 90 to 103 (mode 94); lateral line simple, extending from upper end of gill opening to mid-distal margin of caudal-fin membrane; scale rows above lateral line 8 to 12 (mode 11), below 16 to 21 (mode 18). Gillrakers 10 or 11 (mode 10) on upper limb, 16 or 17 on lower limb, 26 to 28 (mode 26) total. Vertebrae 10 precaudal and 15 caudal; supraneural bones 2. Swimbladder present, well developed. **Colour:** (preserved specimens) Head and body greyish black dorsally, pale yellowish silver ventrally; membranes of first dorsal fin translucent, spines pale yellow; bases of second dorsal, pectoral, pelvic, anal and caudal fins pale yellow, posterior margins of these fins translucent; pectoral filaments uniformly whitish yellow.

**Geographical Distribution:** Currently known only from 3 rivers, Ensengi, Rajang and Sungai rivers, in western Sarawak, Kalimantan, Malaysia (Fig. 141).

**Habitat and Biology:** Occurs in muddy, fast flowing rivers, 12 m wide and 3 m deep (Feltes *in* Carpenter and Niem, 2001). Inhabits only fresh-water regions, having never been recorded from the estuarine areas behind the river mouths.

**Size:** Maximum standard length at least 20 cm (Motomura *et al.*, 2002b).

**Interest to Fisheries:** Esteemed as a food fish in western Sarawak, Kalimantan, Malaysia.

**Local Names:** None known.

**Literature:** Motomura *et al.* (2002b).

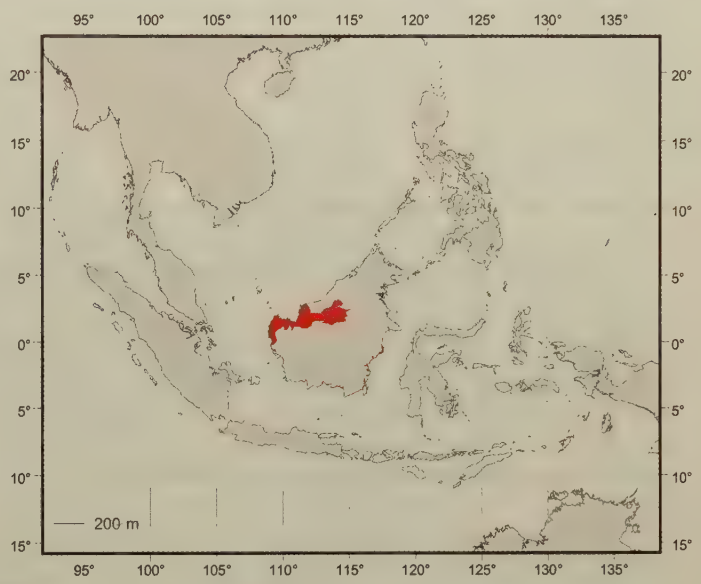



**Fig. 141** ***Polynemus hornadayi***
Known distribution

**Remarks:** ***P. hornadayi*** and ***P. paradiseus,*** both have VII first dorsal-fin spines, whereas all other polynemid species have VIII spines. However, radiographs of ***P. hornadayi*** indicate that 4 of 26 specimens examined by the author have a grain of oval bone (diameter less than about 1 mm) buried under the subcutaneous tissue in front of the first dorsal-fin spine and associated with the first pterygiophore (see Motomura *et al.*, 2002b: fig. 3B). While the anteriormost dorsal-fin spine of other polynemid species is also small, the spine is conventionally "spine-shaped" (not oval) with a dorsally exposed tip (see Motomura, Iwatsuki and Kimura, 2001b: fig. 4, Motomura *et al.*, 2002b: fig. 3C). The oval bone associated with the first pterygiophore in some ***P. hornadayi*** is considered to represent the final stages of degeneration from an original spine precursor.

At a glance, ***P. hornadayi*** and ***P. paradiseus*** can be easily distinguished from each other by the shape of the occipital profile, that of ***P. hornadayi*** protruding strongly whereas that of ***P. paradiseus*** is nearly straight throughout life. In meristic characters, ***P. hornadayi*** differs from ***P. paradiseus*** in having lower counts of anal-fin soft rays [11 or 12 (mode 11) versus 12 (rarely 11 or 13) in the latter] and gillrakers [26 to 28 (mode 26) versus 30 to 34 (mode 32 or 33) in ***P. paradiseus***], and higher counts of pectoral-fin rays [16 to 19 (mode 18) versus 15 to 18 (mode 17) in ***P. paradiseus***], scales above and below the lateral line [8 to 12 (mode 11) and 16 to 21 (mode 18) versus 6 or 7 (mode 7) and 10 to 12 (mode 11), respectively in ***P. paradiseus***] and pored lateral-line scales [90 to 103 (mode 94) versus 66 to 71 (mode 70) in ***P. paradiseus***]. While ***P. hornadayi*** is similar to ***P. paradiseus*** in having 7 pectoral filaments, in the former the fifth pectoral filament is the longest [323 to 339% (mean 331%) of standard length] and the fourth filament extends well beyond the posterior central margin of the caudal fin, whereas in the latter the sixth filament is the longest [181 to 248% (mean 208%) of standard length] and the fourth filament fails to reach the posterior central margin of the caudal fin. The pectoral-fin ray of ***P. hornadayi*** is also relatively longer than that of ***P. paradiseus*** [posterior tip of pectoral fin reaching to midpoint of anal-fin base, 39 to 47% (mean 42%) of standard length versus not reaching, 30 to 35% (mean 33%) of standard length, respectively]. Furthermore, the posterior margin of the premaxilla of ***P. hornadayi*** is deeper than that of ***P. paradiseus*** [4 to 5% (mean 5%) of standard length

versus 3 to 4% (mean 4%) of standard length, respectively], ***P. hornadayi*** also tending to have a slightly longer head [26 to 29% (mean 28%) of standard length], postorbital [18 to 21% (mean 20%) of standard length], and pectoral-fin base [14 to 15% (mean 14%) of standard length], and greater pelvic-fin ray lengths [19 to 22% (mean 20%) of standard length] than ***P. paradiseus*** [24 to 27% (mean 27%), 17 to 19% (mean 18%), 13 to 14% (mean 13%) and 15 to 18% (mean 16%) of standard length, respectively], although the proportional length measurements overlapped between the 2 species (see Motomura *et al.*, 2002b: fig. 8). Internally, ***P. hornadayi*** differs from ***P. paradiseus*** in having a well-developed swimbladder (absent in the latter). Furthermore, the former frequently has a vestigial anal fin spine buried under subcutaneous tissue (62%, 16 of 26 specimens), such being absent in ***P. paradiseus*** (see Motomura *et al.*, 2002b: table 3).

## *Polynemus kapuasensis* Motomura and van Oijen, 2003

**Fig. 142; Plate VId**

***Polynemus kapuasensis*** Motomura and van Oijen, 2003: 394, figs 1, 3a, 6 [type locality: Kapuas River Basin, fish market at Sintang, Kalimantan, Indonesia; holotype (CAS 47198, 151 mm standard length); 11 paratypes (CAS 217348, 3 specimens, 133 to 172 mm standard length; CAS 49454, 5 specimens, 33 to 76 mm standard length; CAS 217161, 3 specimens, 83 to 108 mm standard length)].

**Synonyms:** None.

**FAO Names: En** - Kapuas elegant paradise fish; **Fr** - Barbure paradis de Kapuas; **Sp** - Barbudo paraíso de Kapuas.

**Fig. 142** ***Polynemus kapuasensis***

**Diagnostic Features:** A medium-sized species. Body depth at first dorsal-fin origin 23 to 25% (mean 24%) of standard length; head length 22 to 23% (mean 23%) of standard length in adults (more than about 130 mm standard length), 24 to 29% (mean 27%) of standard length in juveniles (less than about 110 mm standard length). Snout pointed; occipital profile nearly straight or slightly protruding. Posterior margin of maxilla extending well beyond level of posterior margin of adipose eyelid; upper-jaw length 10 to 11% (mean 10%) of standard length, approximately equal to caudal-peduncle depth [10 to 11% (mean 11%) of standard length]; depth of posterior margin of maxilla (2% of standard length) slightly less than eye diameter [3 to 4% (mean 3%) of standard length]; lip on lower jaw well developed, dentary teeth restricted to dorsal surface; teeth villiform in broad bands on vomer, palatines and ectopterygoids. Posterior margin of preopercle serrated. First dorsal fin with VIII spines, all spine bases of similar thickness; second dorsal fin with I spine and 15 or 16 (mode 15) soft rays; anal fin with III spines and 11 or 12 (mode 12) soft rays, anal-fin base less than second dorsal-fin base; pectoral fin with 15 to 17 (mode 15) rays (all rays unbranched), its length 29 to 33% (mean 31%) of standard length, posterior tip not extending beyond level of anal-fin origin in adults (more than about 70 mm standard length) or extending beyond level of anal-fin origin in juveniles (less than about 50 mm standard length); pectoral filaments usually 15 on each side of body, rarely 16 on each side or asymmetrically 15 and 16; first pectoral filament shortest, extending beyond level of pelvic-fin origin; second to seventh pectoral filaments not reaching to level of posterior tip of pelvic fin; eighth and ninth pectoral filaments extending beyond level of posterior tip of pelvic fin, but not reaching to level of anal-fin origin; tenth pectoral filament extending slightly beyond level of anal-fin origin; eleventh pectoral filament extending slightly beyond level of posterior end of anal-fin base; twelfth pectoral filament extending beyond level of posterior margin of central caudal fin, but not reaching to level of posterior

tips of caudal-fin lobes; thirteenth to fifteenth (or sixteenth if present) pectoral filaments longer than total length; thirteenth pectoral filament probably longest, 332 to 397% (mean 365%) of standard length; caudal fin deeply forked, upper and lower caudal-fin lobes not filamentous, upper caudal-fin lobe 41 to 51% (mean 46%) and lower lobe 35 to 50% (mean 40%) of standard length. Pored lateral-line scales 100 to 110 (mode 103); lateral line simple, extending from upper end of gill opening to mid-distal margin of caudal-fin membrane; scale rows above lateral line 9 to 11 (mode 10), below 17 to 20 (mode 18); caudal-peduncle scales 35 to 40 (mode 38). Gillrakers 9 to 11 (mode 11) on upper limb, 16 to 18 (mode 16 and 18) on lower limb, 25 to 29 (mode 28) total. Vertebrae 10 precaudal and 15 caudal; supraneural bones 2. Swimbladder present. **Colour:** Head and body bluish gray dorsally, silver ventrally; bases of first and second dorsal, anal and caudal fins reddish gray; first and second dorsal and caudal fins grayish white; posterior part of anal fin bluish white, remaining parts of anal and pelvic fins and pectoral filaments white; pectoral fin translucent.

**Geographical Distribution:** Currently known only from the Kapuas River system, western Kalimantan, Indonesia (Fig. 143).

**Habitat and Biology:** No data available.

**Size:** Maximum standard length at least 17 cm (Motomura and van Oijen, 2003).

**Interest to Fisheries:** Esteemed as an important food fish along the Kapuas River.

**Local Names:** None known.

**Literature:** Motomura and van Oijen (2003).

**Remarks:** ***Polynemus kapuasensis***, previously identified as ***P. multifilis*** (e.g. Myers, 1936; Roberts, 1989), was recently described as a new species on the basis of 12 specimens from the Kapuas River (Motomura and van Oijen, 2003).

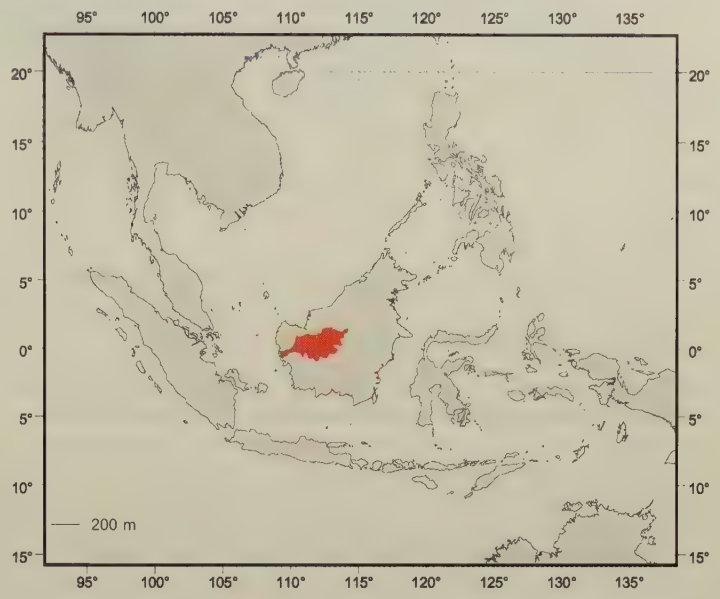



**Fig. 143** ***Polynemus kapuasensis***
Known distribution

***Polynemus kapuasensis*** and ***P. multifilis*** are easily distinguished from all other congeners by having higher counts of pectoral filaments (13 to 16 versus 7 in the latter). ***Polynemus kapuasensis*** differs from ***P. multifilis*** in having higher counts of pectoral filaments (usually 15 on each side of body, rarely asymmetrically 15 and 16, or 16 on each side versus usually 14 on each side, rarely 13 on each side, asymmetrically 13 and 14, or 14 and 15 in the latter), pored lateral-line scales [100 to 110 (mode 103) versus 83 to 99 (mode 86)], scale rows above and below lateral line [9 to 11 (mode 10) and 17 to 20 (mode 18), respectively versus 7 or 8 (mode 8) and 14 to 18 (mode 15), respectively] and caudal-peduncle scales [35 to 40 (mode 38) versus 28 to 37 (mode 32)] (see Motomura and van Oijen, 2003: tables 1-4). Furthermore, ***P. kapuasensis*** tends to have a slightly shorter head and anal-fin base lengths [22 to 23% (mean 23%) of standard length in adults more than about 130 mm standard length and 12 to 14% (mean 14%) of standard length, respectively] than ***P. multifilis*** [23 to 29% (mean 25%) of standard length and 15 to 17% (mean 15% of standard length, respectively], although the proportional measurements for the lengths overlapped between the two species, especially in young stages (see Motomura and van Oijen, 2003: fig. 6a-b). Moreover, the former has a short pectoral fin [29 to 33% (mean 31%) of standard length], its posterior tip not extending beyond the level of the anal-fin origin in adults (more than about 70 mm standard length), whereas the latter has a long pectoral fin [33 to 38% (mean 36%) of standard length], its posterior tip reaching or extending beyond the level of the anal-fin origin throughout life (see Motomura and van Oijen, 2003: fig. 6c).

## ***Polynemus melanochir dulcis*** Motomura and Sabaj, 2002

**Fig. 144; Plate VIe**

***Polynemus melanochir dulcis*** Motomura and Sabaj, 2002: 182, fig. 1 [type locality: Lake Tonle Sap, Cambodia; holotype (ANSP 178011, 135 mm standard length); 2 paratypes (AMS I. 40968-001, 126 mm standard length; BSKU 14850, 128 mm standard length)].

**Synonyms:** None.

**FAO Names: En** - Lake blackhand paradise fish; **Fr** - Barbure paradis à doigts noirs de lac; **Sp** - Barbudo paraíso de mano negra lacustre.

**Fig. 144** ***Polynemus melanochir dulcis***

**Diagnostic Features:** A medium-sized species. Body depth at first dorsal-fin origin 23% of standard length; head length 27 to 28% (mean 28%) of standard length. Snout strongly pointed; occipital profile nearly straight. Posterior margin of maxilla extending well beyond level of posterior margin of adipose eyelid; upper-jaw length 14 to 15% (mean 14%) of standard length, greater than caudal-peduncle depth [10 to 11% (mean 10%) of standard length]; depth of posterior margin of maxilla [3 to 4% (mean 4%) of standard length] greater than eye diameter (3% of standard length); lip on lower jaw well developed, dentary teeth restricted to dorsal surface; teeth villiform in broad bands on palatines and ectopterygoids; vomerine tooth plate covered with skin and teeth absent. Posterior margin of preopercle serrated. First dorsal fin with VIII spines, all spine bases of similar thickness; second dorsal fin with I spine and 16 soft rays; anal fin with III spines and 11 or 12 (mode 12) soft rays, anal-fin base less than second dorsal-fin base; pectoral fin with 16 or 17 (mode 16) rays (all rays unbranched), its length 34 to 35% (mean 33%) of standard length, posterior tip not reaching to or just reaching to level of anal-fin origin; pectoral filaments 7; first (shortest) and second pectoral filaments extending beyond level of pelvic-fin origin but not reaching to level of posterior tip of pelvic fin; third pectoral filament reaching near anal-fin origin; fourth pectoral filament extending slightly beyond level of middle of anal-fin base or posterior base of anal fin; fifth pectoral filament extending slightly beyond caudal-fin base or posterior mid-distal margin of caudal fin; sixth and seventh [longest, its length 128 to 153% (mean 141%) of standard length] pectoral filaments extending well beyond posterior tips of caudal fin; caudal fin deeply forked, upper and lower caudal-fin lobes not filamentous, upper caudal-fin lobe 34 to 35% (mean 35%) and lower lobe 34 to 38% (mean 36%) of standard length. Pored lateral-line scales 71 or 72 (mode 71); lateral line simple, extending from upper end of gill opening to mid-distal margin of caudal-fin membrane; scale rows above lateral line 7, below 12 or 13 (mode 13). Gillrakers 12 on upper limb, 17 to 19 (mode 17) on lower limb, 29 to 31 (mode 29) total. Vertebrae 10 precaudal and 15 caudal; supraneural bones 2. Swimbladder absent. **Colour:** (preserved specimens) Head and body greyish black dorsally, pale whitish yellow ventrally; posterior tip of first dorsal fin intense black, other parts whitish yellow; posterior margins of second dorsal, pelvic, anal and caudal fins translucent (posterior margin of second dorsal fin blackish in a single specimen, BSKU 14850), anterior margin of second dorsal fin blackish, other parts whitish yellow; pectoral fin, except posterior tip and base, intense black (translucent in a single specimen, AMS I. 40968-001); base of pectoral filaments whitish yellow, becoming blackish posteriorly.

**Geographical Distribution:** Currently known only from Lake Tonle Sap, upper end of the lower Mekong River floodplain, Cambodia (Fig. 145).

**Habitat and Biology:** No data available.

**Size:** Maximum standard length at least 135 mm (Motomura and Sabaj, 2002).

**Interest to Fisheries:** Unknown.

**Local Names:** CAMBODIA: Trey pream.

**Literature:** Motomura and Sabaj (2002).

**Remarks:** ***P. melanochir dulcis*** and ***P. m. melanochir*** are uniquely characterized by the absence of vomerine teeth (present in all congeners). Likewise, both subspecies have a very black pectoral fin. Although the pectoral fin of ***P. paradiseus*** is occasionally tinged with

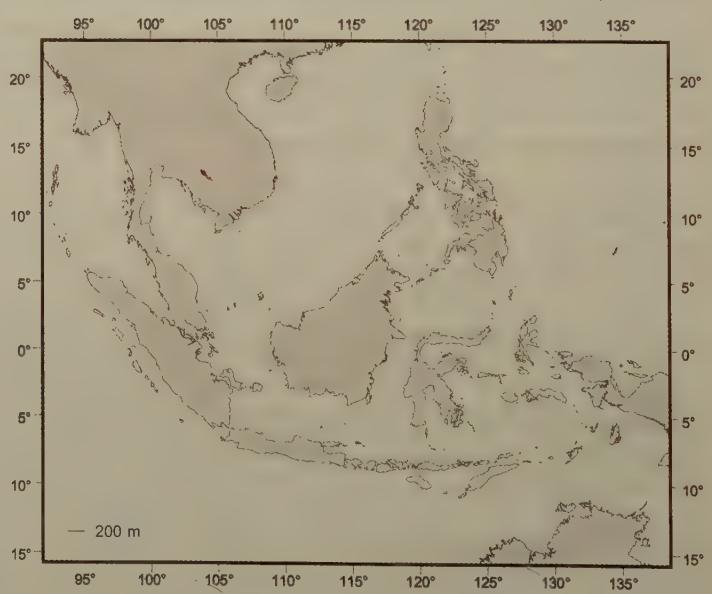



**Fig. 145** ***Polynemus melanochir dulcis***
Known distribution

black, that species has villiform vomerine teeth. The vomer and pectoral fin characters of *P. m. dulcis* and *P. m. melanochir* are very similar. Furthermore, the meristic characters of both subspecies completely overlap (see Motomura and Sabaj, 2002: table 3). However, *P. m. dulcis* differs from the latter in having a greater snout length [7% of standard length versus 5 to 6% (mean 6%) of standard length in the latter; see Motomura and Sabaj, 2002: tables 1-2, figs. 4-5] and shorter upper caudal-fin lobe length [34 to 35% (mean 35%) of standard length versus 34 to 44% (mean 39%) of standard length; see Motomura and Sabaj, 2002: tables 1-2, fig. 5].

In addition, the head length [27 to 28% (mean 28%) of standard length], eye diameter (3%), orbit diameter [3 to 4% (mean 3%)], upper-jaw length [14 to 15% (mean 14%)], second dorsal-fin base length [20 to 21% (mean 21%)] and longest pelvic-fin ray length [17 to 18% (mean 18%)] in *P. m. dulcis* are greater than those in *P. m. melanochir* [24 to 27% (mean 26%), 1 to 2% (mean 2%), 2 to 3% (mean 2%), 12 to 14% (mean 13%), 18 to 21% (mean 20%) and 14 to 17% (mean 16%), respectively; see Motomura and Sabaj, 2002: tables 1-2].

*Polynemus m. dulcis* appears to be one of the rarest polynemids and only 3 type specimens are known from museum collections.

## *Polynemus melanochir melanochir* Valenciennes, 1831

**Fig. 146; Plates VIf**

*Polynemus melanochir* Valenciennes *in* Cuvier and Valenciennes, 1831: 513 [mistakenly reported from India (see Motomura and Sabaj, 2002), based solely on a drawing sent from Sumatra, Indonesia (see Feltes, 1991: fig. 1); type locality: Kuching Bay, Sarawak, Kalimantan, Malaysia, based on a neotype (ZRC 37829, 179 mm standard length) designated by Motomura and Sabaj, 2002].

**Synonyms:** *Polynemus macronema* Bleeker, 1852 (not of Pel): 419 (primary homonym of *Polynemus macronemus* Pel). *Polynemus borneënsis* Bleeker, 1857b: 3 (replacement name for *P. macronema* Bleeker, but incorrect original spelling). *Polynemus borneensis* Bleeker, 1858a: 2 [type locality: Banjarmasin, Pontianak and Sampit, Kalimantan, Indonesia; justified emendation of *P. borneënsis* Bleeker; 3 syntypes (RMNH 6013, 148 to 190 mm standard length) determined from 5 Bleeker specimens by Motomura and Sabaj, 2002]. *Galeoides microps* Steindachner, 1869a: 126 [type locality: China (but probably erroneous, see Motomura and Sabaj, 2002); holotype (NMW 77569, 171 mm standard length)]. *Polynemus melanopus* Sauvage, 1881: 101 [type locality: Saigon (= Ho-chi-minh), Viet Nam; 4 syntypes (MNHN A. 3048, 2 specimens, 139 to 160 mm standard length; MNHN A. 3049, 2 specimens, 130 to 160 mm standard length)]. *Trichidion hilleri* Fowler, 1905: 502, fig. 11 [type locality: Baram River, Sarawak, Kalimantan, Malaysia; holotype (ANSP 114895, 166 mm standard length)].

**FAO Names: En** - Blackhand paradise fish; **Fr** - Barbure paradis à doigts noirs; **Sp** - Barbudo paraíso de mano negra.

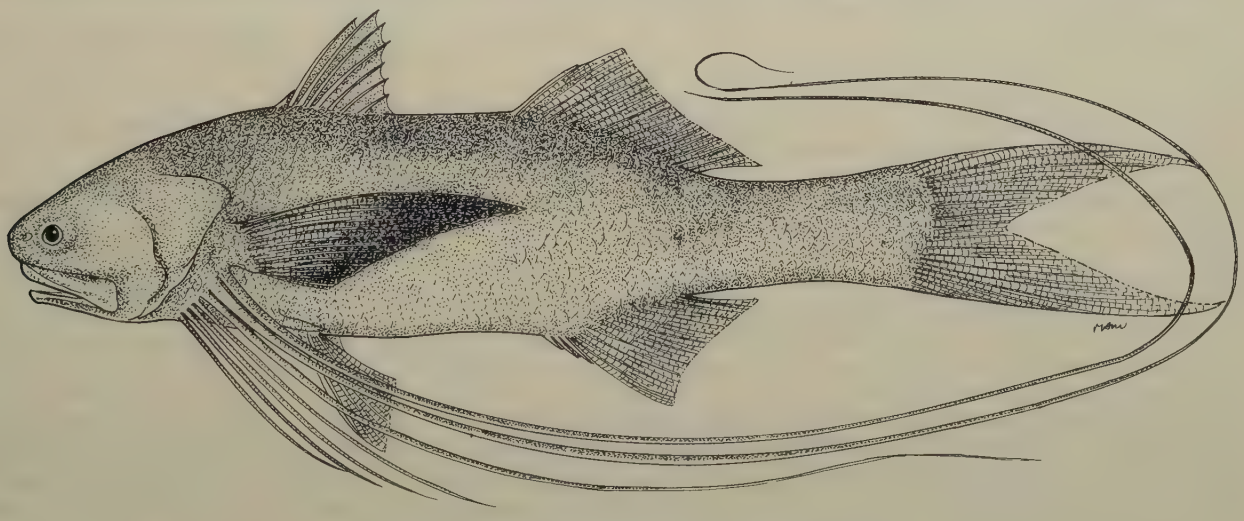


**Fig. 146** *Polynemus melanochir melanochir*

**Diagnostic Features:** A medium-sized species. Body depth at first dorsal-fin origin 22 to 25% (mean 23%) of standard length; head length 25 to 27% (mean 26%) of standard length. Snout pointed; occipital profile nearly straight. Posterior margin of maxilla extending well beyond level of posterior margin of adipose eyelid; upper-jaw length 12 to 14% (mean 13%) of standard length, greater than caudal-peduncle depth [10 to 13% (mean 11%) of standard length]; depth of posterior margin of maxilla [3 to 5% (mean 4%) of standard length] greater than eye diameter [1 to 2% (mean 2%) of standard length]; lip on lower jaw well developed, dentary teeth restricted to dorsal surface; teeth villiform in broad bands on palatines and ectopterygoids; vomerine tooth plate covered with skin and teeth absent. Posterior margin of preopercle serrated. First dorsal fin with VIII spines, all spine bases of similar thickness; second dorsal fin with I spine and 15 or 16 (mode 16; rarely

18, 1 of 40 specimens) soft rays; anal fin with III spines and 11 or 12 (mode 12; rarely 13, 1 of 40 specimens) soft rays, anal-fin base less than second dorsal-fin base; pectoral fin with 15 to 18 (mode 17) rays (all rays unbranched), its length 30 to 35% (mean 32%) of standard length, posterior tip not reaching to, just reaching to or extending slightly beyond level of anal-fin origin; pectoral filaments 7; first pectoral filament shortest, extending beyond level of pelvic-fin origin but not reaching to level of posterior tip of pelvic fin; second pectoral filament extending slightly beyond level of posterior tip of pelvic fin; third pectoral filament reaching near anal-fin origin or extending slightly beyond level of posterior tip of pelvic fin; fourth pectoral filament reaching to or extending slightly beyond level of posterior base of anal fin; fifth pectoral filament extending well beyond caudal-fin base, but not reaching posterior tips of caudal fin, or extending slightly beyond caudal-fin base, not reaching to mid-distal margin of caudal-fin; sixth and seventh [longest, its length 134 to 193% (mean 159%) of standard length] pectoral filaments extending well beyond posterior tips of caudal fin; caudal fin deeply forked, upper and lower caudal-fin lobes not filamentous, upper caudal-fin lobe 35 to 44% (mean 39%) and lower lobe 29 to 42% (mean 36%) of standard length. Pored lateral-line scales 68 to 74 (mode 70); lateral line simple, extending from upper end of gill opening to mid-distal margin of caudal-fin membrane; scale rows above lateral line 6 to 8 (mode 7), below 11 to 14 (mode 12). Gillrakers 11 to 14 (mode 13) on upper limb, 16 to 20 (mode 18) on lower limb, 27 to 33 (mode 31) total. Vertebrae 10 precaudal and 15 caudal; supraneural bones 2. Swimbladder absent. **Colour:** Head and body greyish black dorsally, yellow ventrally; posterior tip of first dorsal fin intense black, other parts yellow; posterior margin and tip of second dorsal fin black, other parts yellow; pelvic fin uniformly yellow; posterior margins of anal and caudal fin translucent, other parts yellow; pectoral fin intense black, except for vivid yellow base; base of pectoral filaments vivid yellow, becoming blackish posteriorly.

**Geographical Distribution:** Currently known from the lower Mekong River and related rivers (Cambodia and southern Viet Nam), and Kalimantan (Malaysia and Indonesia) (Fig. 147).

**Habitat and Biology:** No data available.

**Size:** Maximum standard length at least 20 cm (Motomura and Sabaj, 2002).

**Interest to Fisheries:** Esteemed as an important food fish at least along the lower Mekong River and related rivers.

**Local Names:** CAMBODIA: Trey pream loeung; INDONESIA: Kurau.

**Literature:** Motomura and Sabaj (2002).

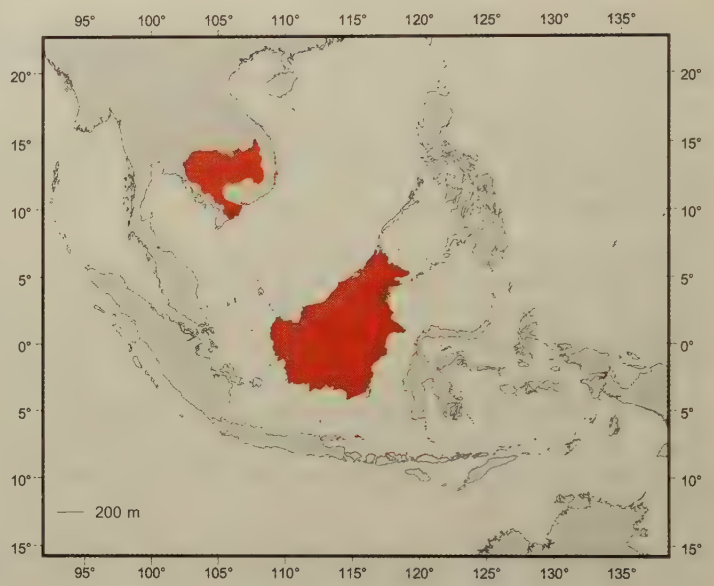



**Fig. 147** ***Polynemus melanochir melanochir***
Known distribution

**Remarks:** The name, ***Polynemus melanochir***, has been used by many researchers [e.g., Bleeker, 1849; Myers, 1936 (as ***Filimanus melanochir***); Gloerfelt-Tarp and Kailola, 1984 (as ***F. melanochir***); Bleeker, 1983 (as ***Trichidion melanochir***)]. However, Feltes (1991) recognized that the polynemid species commonly identified as ***P. melanochir*** (***F. melanochir*** or ***T. melanochir***) was not true ***P. melanochir***, but in fact represented a separate undescribed species (described as ***F. perplexa*** Feltes, 1991).

Although the original description of ***P. melanochir*** was brief, the drawing clearly shows the very black pectoral-fin rays (see Feltes, 1991: fig. 1), such being a characteristic of the specimens considered here as ***P. melanochir melanochir***.

***Polynemus borneensis*** has been regarded as a valid species by many researchers (e.g. Weber and de Beaufort, 1922; Kottelat *et al.*, 1993; Rainboth, 1996). However, recent examination of the 3 syntypes of ***P. borneensis***, the neotype of ***P. m. melanochir***, and other specimens showed that they represented a single species (see Motomura and Sabaj, 2002). Therefore, ***P. borneensis*** is regarded as a junior synonym of the latter.

***Galeoides microps*** was described by Steindachner (1869a) on the basis of a single specimen and later described in more detail (Steindachner, 1869b). Although there is no indication in the literature that the holotype of ***G. microps*** has been re-examined since Steindachner's (1869a-b) descriptions (Springer, 1982), the species has been regarded as valid, belonging to the genus ***Galeoides*** (e.g. Fowler, 1935; Myers, 1936; Springer, 1982; Hureau *in* Whitehead *et al.*, 1986). Recently, Motomura, Mikschi and Iwatsuki (2001) and Motomura and Sabaj (2002) examined the holotype of ***G. microps*** and regarded it as a junior synonym of ***P. m. melanochir***.

***Polynemus melanopus*** was described by Sauvage (1881) on the basis of 4 specimens from Ho-chi-minh, Viet Nam. The characters, black pectoral fin, vomer without teeth and short snout (5 to 6% of standard length), of the 4 syntypes were found to be consistent with those of the specimens considered here as ***P. m. melanochir*** (see Motomura and Sabaj, 2002). Therefore, ***P. melanopus*** is also regarded as a junior synonym of the latter.

***Trichidion hilleri*** was described by Fowler (1905) on the basis of a single specimen from Baram River, Sarawak, Kalimantan, Malaysia. Although the species has been regarded as valid (as ***Polynemus hilleri***) by many researchers

(e.g. Kottelat *et al.*, 1993; Kottelat and Lim, 1995), examination of the holotype of ***T. hilleri*** and the specimens considered here as ***P. m. melanochir*** showed that they represented a single species (see Motomura and Sabaj, 2002). Therefore, ***T. hilleri*** is also regarded as a junior synonym of the latter.

***Polynemus m. melanochir*** and ***P. m. dulcis*** are uniquely characterized by the absence of vomerine teeth (present in all congeners). Comparisons of ***P. m. melanochir*** with ***P. m. dulcis*** are given in the account of the latter.

## ***Polynemus multifilis*** Temminck and Schlegel, 1843

**Fig. 148; Plate VIg**

***Polynemus multifilis*** Temminck and Schlegel, 1843: 29 [type locality: near Banjarmasin, south Kalimantan; holotype (RMNH 436, 136 mm standard length)].

**Synonyms:** ***Polynemus quatordecimfilis*** Pel, 1851: 10 [type locality: near Banjarmasin, south Kalimantan; objective synonym of ***P. multifilis*** Temminck and Schlegel; holotype (RMNH 436, 136 mm standard length)].

**FAO Names: En** - Elegant paradise fish; **Fr** - Barbure paradis élégante; **Sp** - Barbudo paraíso elegante.

**Fig. 148** ***Polynemus multifilis***

**Diagnostic Features:** A medium-sized species. Body depth at first dorsal-fin origin 23 to 27% (mean 24%) of standard length; head length 23 to 29% (mean 25%) of standard length. Snout pointed; occipital profile nearly straight or slightly protruding. Posterior margin of maxilla extending well beyond level of posterior margin of adipose eyelid; upper-jaw length 9 to 11% (mean 10%) of standard length, approximately equal to caudal-peduncle depth [11 to 12% (mean 11%) of standard length]; depth of posterior margin of maxilla [2 to 3% (mean 2%) of standard length] slightly less than eye diameter [3 to 4% (mean 3%) of standard length]; lip on lower jaw well-developed, dentary teeth restricted to dorsal surface; teeth villiform in broad bands on vomer, palatines and ectopterygoids. Posterior margin of preopercle serrated. First dorsal fin with VIII spines, all spine bases of similar thickness; second dorsal fin with I spine and 14 to 16 (mode 15) soft rays; anal fin with III spines and 11 to 13 (mode 12) soft rays, anal-fin base less than second dorsal-fin base; pectoral fin with 14 to 16 (mode 15) rays (all rays unbranched), its length 33 to 38% (mean 36%) of standard length, posterior tip reaching or extending beyond level of anal-fin origin throughout life; pectoral filaments usually 14 on each side of body, rarely 13 on each side or asymmetrically 13 and 14, or 14 and 15; first pectoral filament shortest, extending beyond level of pelvic-fin origin; second to sixth pectoral filaments not reaching to level of posterior tip of pelvic fin; seventh and eighth pectoral filaments not reaching or extending beyond level of posterior tip of pelvic fin; ninth pectoral filament extending well beyond level of posterior tip of pelvic fin, sometimes extending beyond level of anal-fin origin; tenth pectoral filament extending beyond level of anal-fin origin, rarely extending beyond level of posterior end of anal-fin base; eleventh pectoral filament extending beyond level of posterior end of hypural plate, but not reaching to level of posterior tips of caudal-fin lobes; twelfth to fourteenth (or fifteenth if present) pectoral filaments longer than total length; twelfth pectoral filament probably longest, 182 to 376% (mean 295%) of standard length; caudal fin deeply forked, upper and lower caudal-fin lobes not filamentous, upper caudal-fin lobe 38 to 46% (mean 43%) and lower lobe 32 to 41% (mean 38%) of standard length. Pored lateral-line scales 83 to 99 (mode 86); lateral line simple, extending from upper end of gill opening to mid-distal margin of caudal-fin membrane; scale rows above lateral line 7 or 8 (mode 8), below 14 to 18 (mode 15); caudal-peduncle scales 28 to 37 (mode 32). Gillrakers 9 to 11 (mode 10) on

upper limb, 15 to 17 (mode 16) on lower limb, 24 to 27 (mode 26) total. Vertebrae 10 precaudal and 15 caudal; supraneural bones 2. Swimbladder present. Colour: Head and body dark purplish blue dorsally, silver ventrally; bases of first and second dorsal, anal and caudal fins grayish white, anterior margin of pelvic fin white, remaining parts of those fins semitransparent; pectoral fin semitransparent; pectoral filaments white.

**Geographical Distribution:** Currently known from the Chao Phraya River system (Thailand), Musi and Batanghari rivers (southeastern Sumatra, Indonesia), and Sampit and Barito rivers (southern Kalimantan, Indonesia). The species is not known from the Kapuas River (where it is replaced by the endemic *P. kapuasensis*) (Fig. 149).

**Habitat and Biology:** Occurs on sandy or muddy bottoms in fresh-water rivers. Feeds on crustaceans, small fishes and benthic organisms.

**Size:** Maximum standard length at least 28 cm (Feltes *in* Carpenter and Niem, 2001).

**Interest to Fisheries:** Esteemed as a food fish at least along the Chao Phraya River. The species has been often exported to Japan as an aquarium fish.

**Local Names:** None known.

**Literature:** Motomura and van Oijen (2003).

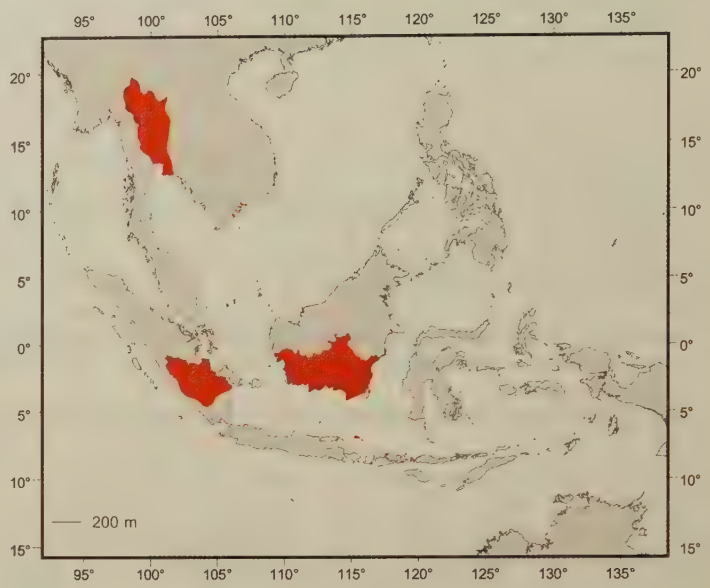



**Fig. 149** ***Polynemus multifilis***
Known distribution

**Remarks:** The name, ***Polynemus multifilis***, first appeared in a footnote of a description of specimens of ***Polynemus plebejus*** Broussonet, 1782 (presently regarded as ***Polydactylus plebeius***) by Temminck and Schlegel (1843). Many researchers (e.g. Myers, 1936; Eschmeyer, 1998; Feltes *in* Carpenter and Niem, 2001) indicated the authorship of ***P. multifilis*** as Schlegel. However, the authorship of the species should be treated as Temminck and Schlegel (see Motomura and van Oijen, 2003). ***Polynemus multifilis*** was originally described on the basis of a single specimen (RMNH 436, 136 mm standard length), and later described in more detail by Schlegel (1852). Pel (1851) described ***P. quatordecimfilis*** as a new species, but ***P. quatordecimfilis*** is a objective synonym of ***P. multifilis*** (see Motomura and van Oijen, 2003). Type material of ***P. multifilis*** and ***P. quatordecimfilis*** were determined by Motomura and van Oijen (2003). Bleeker (1852) described ***Polynemus polydactylus*** as a new species on the basis of a single specimen (RMNH 6001, 133 mm standard length) from Banjarmasin, southern Kalimantan, Indonesia. Because that name was preoccupied by ***P. polydactylus*** of Vahl (1798) which has presently been regarded as a junior synonym of ***Galeoides decadactylus*** (Bloch, 1795), Bleeker's ***P. polydactylus*** is permanently invalid, treated as a primary homonym of Vahl's ***P. polydactylus***. Subsequently, Bleeker (1860) recognized that his ***P. polydactylus*** is the same species as ***P. multifilis*** (his opinion concurred with here).

***Polynemus multifilis*** is easily distinguished from other congeners, except for ***P. kapuasensis***, by having 13 to 15 pectoral filaments (7 in the latter). Comparisons of ***P. multifilis*** with ***P. kapuasensis*** are given in the account of the latter.

## ***Polynemus paradiseus*** Linnaeus, 1758

**Fig. 150; Pl. VIh**

***Polynemus paradiseus*** Linnaeus, 1758: 317 [original locality: Bengal, India, based on a figure (see Motomura *et al.*, 2002d: fig. 5) and description of Edwards (1743-1751); type locality: Gariahat, Calcutta, West Bengal, India, based on a neotype (NRM 47529, 198 mm standard length) designated by Motomura *et al.*, 2002b].

**Synonyms:** ***Polynemus risua*** Hamilton, 1822: 228, 381 (type locality: vicinity of Lukhipur, India; no types known). ***Polynemus toposui*** Hamilton, 1822: 232, 381 (type locality: estuary of Ganges River, West Bengal, India; no types known). ***Polynemus aureus*** Hamilton, 1822: 232, 381 (type locality: Calcutta, West Bengal, India; no types known). ***Polynemus longifilis*** Cuvier *in* Cuvier and Valenciennes, 1829: 365 [type locality: Pondicherry and Ganges River, India; Manila, Philippines (probably erroneous, see Motomura *et al.*, 2002b); 7 syntypes (MHNG 148.24, 134 mm standard length; MNHN 2200, 3 specimens, 141 to 157 mm standard length; MNHN A. 3045, 115 mm standard length; MNHN A. 4803, dried specimen, 154 mm standard length; SMF 439, 124 mm standard length)].

**FAO Names: En** - Paradise threadfin; **Fr** - Barbure paradis; **Sp** - Barbudo paraíso.

**Fig. 150** ***Polynemus paradiseus***

**Diagnostic Features:** A medium-sized species. Body depth at first dorsal-fin origin 20 to 28% (mean 24%) of standard length; head length 24 to 27% (mean 26%) of standard length. Snout pointed; occipital profile nearly straight. Posterior margin of maxilla extending well beyond level of posterior margin of adipose eyelid; upper-jaw length 13 to 15% (mean 14%) of standard length, greater than caudal-peduncle depth [9 to 12% (mean 10%) of standard length]; depth of posterior margin of maxilla [3 to 4% (mean 4%) of standard length] greater than eye diameter [1 to 2% (mean 2%) of standard length]; lip on lower jaw well developed, dentary teeth restricted to dorsal surface; teeth villiform in broad bands on vomer, palatines and ectopterygoids. Posterior margin of preopercle serrated. First dorsal fin with VII spines, all spine bases of similar thickness; second dorsal fin with I spine and 14 or 15 (mode 15) soft rays; anal fin with II spines and 12 (rarely 11 or 13, 2 of 40 specimens) soft rays, anal-fin base less than second dorsal-fin base; pectoral fin with 15 to 18 (mode 17) rays (all rays unbranched), its length 30 to 35% (mean 33%) of standard length, posterior tip reaching to or just short of level of anal-fin origin [but in juveniles (less than about 100 mm standard length) extending slightly beyond anal-fin origin]; pectoral filaments 7; first pectoral filament shortest, not reaching to level of posterior tip of pelvic fin; second pectoral filament not reaching to or extending slightly beyond level of posterior tip of pelvic fin; third pectoral filament just reaching to or not reaching to level of anal-fin origin; fourth pectoral filament reaching near level of posterior base of anal fin or just reaching to caudal-fin base; fifth to seventh pectoral filaments longer than total length; sixth pectoral filament longest, its length 181 to 248% (mean 208%) of standard length; caudal fin deeply forked, upper and lower caudal-fin lobes not filamentous, upper caudal-fin lobe 39 to 49% (mean 44%) and lower lobe 33 to 47% (mean 40%) of standard length. Pored lateral-line scales 66 to 71 (mode 70); lateral line simple, extending from upper end of gill opening to mid-distal margin of caudal-fin membrane; scale rows above lateral line 6 or 7 (mode 7), below 10 to 12 (mode 11). Gillrakers 12 to 14 (mode 13) on upper limb, 17 to 20 (mode 20) on lower limb, 30 to 34 (mode 32 or 33) total. Vertebrae 10 precaudal and 15 caudal; supraneural bones 2. Swimbladder absent. **Colour:** Head and body greyish black dorsally, yellow ventrally; anterior parts of first and second dorsal fins greyish black, other parts pale yellow; pectoral and pelvic fins uniformly vivid yellow; base of pectoral filaments vivid yellow, becoming whitish yellow on posterior tips; anal fin uniformly yellow; posterior margin of caudal fin yellow, other parts greyish black.

**Geographical Distribution:** Currently known from the eastern Indian to western Pacific Oceans, where it ranges over continental shelves from western India to Thailand (Fig. 151). Two specimens (ANSP 11498, 135 to 147 mm standard length) collected (probably pre-1900) from Indonesia, lacked detailed locality and other collection data. An Indonesian distribution of the species therefore needs reconfirmation.

**Habitat and Biology:** Occurs in both estuarine and offshore waters (from depths of less than 27 m), but has been recorded as regularly entering fresh water for breeding purposes (David, 1954). The species feeds on crustaceans, small fishes and benthic organisms.

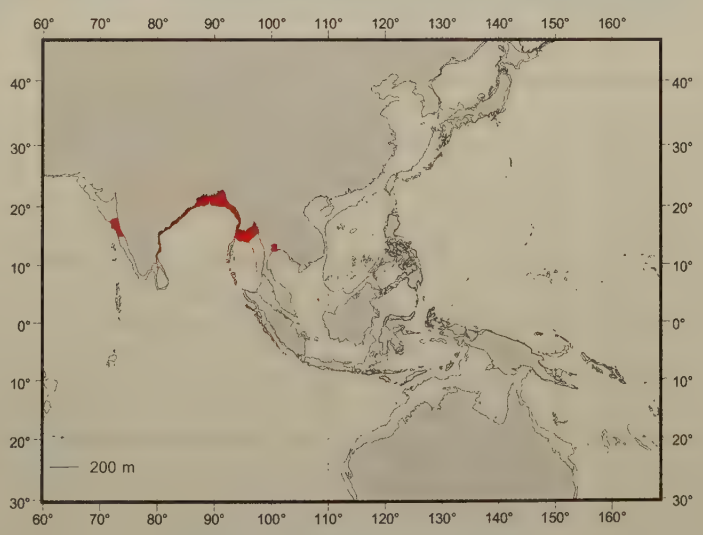



**Fig. 151** ***Polynemus paradiseus***
Known distribution

Sexes of the species are separate (no evidence of hermaphroditism; Kagwade, 1970). Mukhopadhyay *et al.* (1995) inferred that males mature at 110 mm total length; females at 120 mm. They suggested that the species spawns from April to September, in the Hooghly River, India, females collected in October being mostly spent.

According to Gupta (1968), who examined ova diameter in Indian examples of the species, the largest diameter of intraovarian eggs was 1.0 mm, the ova diameter in fully matured specimens being over 0.83 mm. However, Jones and Menon (1953), who had collected fertilized eggs of the same species, had earlier recorded a measurement of 0.7 mm in diameter and possession of an oil globule of 0.4 mm in diameter. They also reported a specimen of 170 mm standard length having about 42 000 ova. Gupta (1968) noted that the right gonad was invariably more fecund than the left.

Jones and Menon's (1953) study of the larval history of ***P. paradiseus*** from Indian waters recorded the swimbladder as developing in the larval stage, but atrophying in juveniles. The yolk sac was absorbed by the 4.3 mm stage. With the completion of scale formation and the elongation of the pectoral filaments to adult proportions, the larvae enter the juvenile stage. Body scale rudiments were apparent in juveniles of 13 to 14 mm.

**Size:** Maximum standard length at least 20 cm (Motomura *et al.*, 2002b).

**Interest to Fisheries:** One of the most important fisheries species for India (especially in West Bengal) and Bangladesh, and Myanmar.

**Local Names:** BANGLADESH: Tapasi; INDIA: Paradise threadfin; MYANMAR: Nga ponnar; THAILAND: Pla nuad pram.

**Literature:** Motomura *et al.* (2002d).

**Remarks:** ***P. paradiseus***, 1 of 3 of the oldest available name for the family Polynemidae, was described on the basis of a figure (reproduced in Motomura *et al.*, 2002b: fig. 5) and description given by Edwards (1743-1751), who briefly described the figured fish (collected from Bengal, India by Dr Mead) as the "Mango-Fish." The specimen used for Edwards' figure and description apparently no longer exists. However, Edwards' figure clearly indicates VII spines in the first dorsal fin and 7 pectoral filaments, the uppermost 3 extending beyond the posterior tips of the caudal-fin lobes and fourth pectoral filament not extending beyond the caudal-fin base. The characters of the specimens considered here as ***P. paradiseus*** agree well with those shown on the figure.

Subsequently, Hamilton (1822) described 3 new species with 7 pectoral filaments, ***Polynemus risua***, ***P. toposui*** and ***P. aureus***, all from India. According to their original descriptions (Hamilton, 1822), all 3 species were characterized by having 7 long pectoral filaments and VII first dorsal-fin spines, but differed from each other in the numbers of dorsal-fin soft rays (17 in ***P. risua***, 16 in ***P. toposui*** and 15 in ***P. aureus***), pectoral-fin rays (17, 16 and 17, respectively) and anal-fin rays (including spines; 15, 16 and 14, respectively). However, these fin-ray numbers are almost wholly within the range of intraspecific variation (see Motomura *et al.*, 2002b). The diagnostic characters of 7 long pectoral filaments and VII first dorsal-fin spines given in the original descriptions (supported by the collection locality) of these species are consistent with those of ***P. paradiseus***. Accordingly, ***P. risua***, ***P. toposui*** and ***P. aureus*** are regarded as junior synonyms of ***P. paradiseus*** (see Motomura *et al.*, 2002b).

Although Fricke (1999) believed ***P. longifilis*** to be a junior synonym of ***Polydactylus plebeius***, which is distributed in the Indo-Pacific, the syntypes of the former clearly differ from examples of the latter, including the neotype, in having 7 pectoral filaments (longer than standard length versus 5, shorter than standard length in the latter) and the orbit diameter smaller than the posterior margin of the maxilla (larger). Examination of the syntypes of ***P. longifilis*** showed them to correspond closely with the specimens considered here as ***P. paradiseus***. Therefore, ***P. longifilis*** is also regarded as a junior synonym of ***P. paradiseus*** (see Motomura *et al.*, 2002b).

## 3. LIST OF NOMINAL SPECIES OF POLYNEMIDAE

The following list gives in order (i) the scientific name as it originally appeared, in alphabetical order according to the specific name; (ii) the author(s) [Cuvier (1829b) = *in* Cuvier and Valenciennes (1829b); Jordan and McGregor (1907) = *in* Jordan and Seale (1907); Valenciennes (1831) = *in* Cuvier and Valenciennes (1831)]; (iii) date of publication; and (iv) present identification.

| NOMINAL SPECIES | PRESENT ALLOCATION |
|---|---|
| *Polydactylus agonasi* Jordan and McGregor, 1906 | *Polydactylus plebeius* |
| *Polynemus americanus* Cuvier, 1829a | *Polydactylus virginicus* |
| *Polynemus antillarum* Perugia, 1896 | *Polydactylus virginicus* |
| *Polynemus approximans* Lay and Bennett, 1839 | *Polydactylus approximans* |
| *Polynemus aquilonaris* Motomura, 2003a | *Polynemus aquilonaris* |
| *Polynemus artedii* Bennett, 1831 | *Pentanemus quinquarius* |
| *Polynemus astrolabi* Sauvage, 1881 | *Galeoides decadactylus* |
| *Polydactylus auratus* McKay, 1970 | *Polydactylus multiradiatus* |
| *Polynemus aureus* Hamilton, 1822 | *Polynemus paradiseus* |
| *Polydactylus bifurcus* Motomura, Kimura and Iwatsuki, 2001 | *Polydactylus bifurcus* |
| *Polynemus borneensis* Bleeker, 1857b | *Polynemus melanochir melanochir* |
| *Polynemus coecus* Macleay, 1878 | *Eleutheronema tetradactylum* |
| *Polynemus californiensis* Thominot, 1886 | *Polydactylus approximans* |
| *Polynemus commersonii* Shaw, 1804 | *Polydactylus plebeius* |
| *Polynemus decadactylus* Bloch, 1795 | *Galeoides decadactylus* |
| *Polynemus diagrammicus* Bleeker, 1849 | *Filimanus xanthonema* |
| *Polynemus dubius* Bleeker, 1854 | *Polynemus dubius* |
| *Polynemus emoi* Lacepède, 1803 | *Polydactylus plebeius* |
| *Polynemus enneadactylus* Cuvier, 1829b | *Galeoides decadactylus* |
| *Polynemus gelatinosus* McClelland, 1843 | *Leptomelanosoma indicum* |
| *Polynemus heptadactylus* Cuvier, 1829b | *Filimanus heptadactyla* |
| *Polynemus hexanemus* Cuvier, 1829b | *Filimanus hexanema* |
| *Trichidion hilleri* Fowler, 1905 | *Polynemus melanochir melanochir* |
| *Polynemus hornadayi* Myers, 1936 | *Polynemus hornadayi* |
| *Polynemus indicus* Shaw, 1804 | *Leptomelanosoma indicum* |
| *Polynemus intermedius* Nichols, 1954 | *Parapolynemus verekeri* |
| *Polynemus kapuasensis* Motomura and van Oijen, 2003 | *Polynemus kapuasensis* |
| *Polydactylus konadaensis* Mishra and Krishnan, 1993 | *Filimanus xanthonema* |
| *Polynemus kuru* Bleeker, 1853b | *Polydactylus sexfilis* |
| *Polynemus lineatus* Lacepède, 1803 | *Polydactylus plebeius* |
| *Polynemus longifilis* Cuvier, 1829b | *Polynemus paradiseus* |
| *Polynemus longipectoralis* Weber and de Beaufort, 1922 | *Polynemus dubius* |
| *Polydactylus longipes* Motomura, Okamoto and Iwatsuki, 2001 | *Polydactylus longipes* |
| *Polynemus lydiae* Curtiss, 1938 | *Polydactylus plebeius* |
| *Polynemus macrochir* Günther, 1867 | *Polydactylus macrochir* |
| *Polynemus macronemus* Pel, 1851 | *Pentanemus quinquarius* |
| *Polynemus macrophthalmus* Bleeker, 1858b | *Polydactylus macrophthalmus* |
| *Polydactylus malagasyensis* Motomura and Iwatsuki, 2001b | *Polydactylus malagasyensis* |
| *Polynemus mango* Lacepède, 1803 | *Polydactylus virginicus* |
| *Polynemus melanochir* Valenciennes, 1831 | *Polynemus melanochir melanochir* |
| *Polynemus malanochir dulcis* Motomura and Sabaj, 2002 | *Polynemus malanochir dulcis* |

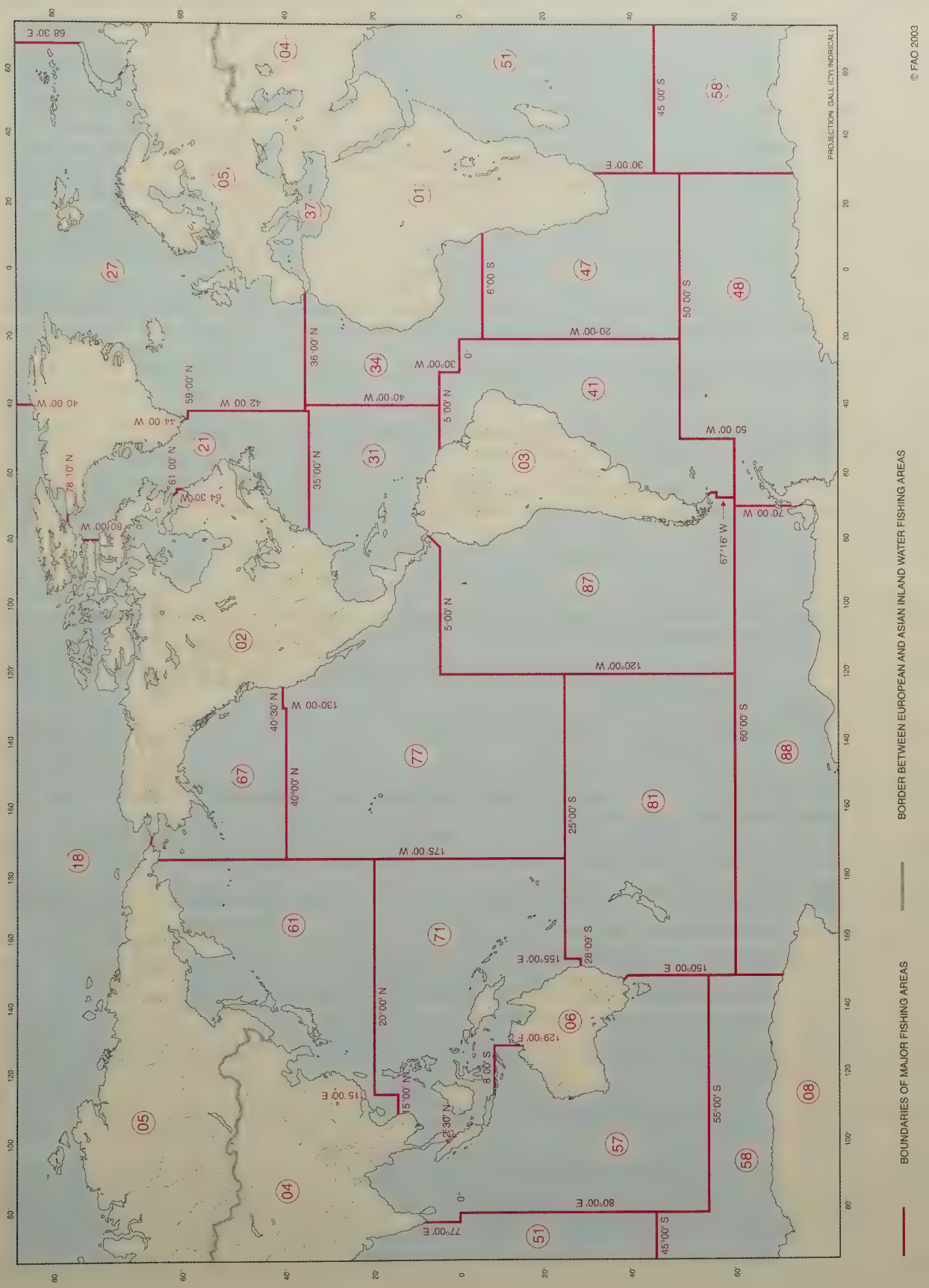
| NOMINAL SPECIES | PRESENT ALLOCATION |
|---|---|
| *Polynemus melanopoma* Günther, 1864 | *Polydactylus opercularis* |
| *Polynemus melanopus* Sauvage, 1881 | *Polynemus melanochir melanochir* |
| *Galeoides microps* Steindachner, 1869 | *Polynemus melanochir melanochir* |
| *Polynemus microstoma* Bleeker, 1851b | *Polydactylus microstomus* |
| *Polynemus multifilis* Temminck and Schlegel, 1843 | *Polynemus multifilis* |
| *Polynemus multiradiatus* Günther, 1860 | *Polydactylus multiradiatus* |
| *Polynemus naso* Walbaum, 1793 | *Polydactylus virginicus* |
| *Polydactylus nigripinnis* Munro, 1964 | *Polydactylus nigripinnis* |
| *Polynemus niloticus* Shaw, 1804 | *Polydactylus plebeius* |
| *Trichidion octofilis* Gill, 1861 | *Polydactylus octonemus* |
| *Polynemus octonemus* Girard, 1858 | *Polydactylus octonemus* |
| *Polynemus oligodon* Günther, 1860 | *Polydactylus oligodon* |
| *Trichidion opercularis* Gill, 1863 | *Polydactylus opercularis* |
| *Polynemus paradiseus* Linnaeus, 1758 | *Polynemus paradiseus* |
| *Filimanus perplexa* Feltes, 1991 | *Filimanus perplexa* |
| *Polydactylus persicus* Motomura and Iwatsuki, 2001b | *Polydactylus persicus* |
| *Polynemus pfeifferi* Bleeker, 1853a | *Filimanus xanthonema* |
| *Polynemus plebeius* Broussonet, 1782 | *Polydactylus plebeius* |
| *Polydactylus plumierii* Lacepède, 1803 | *Polydactylus virginicus* |
| *Polynemus polydactylus* Vahl, 1798 | *Galeoides decadactylus* |
| *Polynemus quadrifilis* Cuvier, 1829b | *Polydactylus quadrifilis* |
| *Polynemus quatordecimfilis* Pel, 1851 | *Polynemus multifilis* |
| *Polynemus quinquarius* Linnaeus, 1758 | *Pentanemus quinquarius* |
| *Polydactylus rhadinus* Jordan and Evermann, 1902 | *Eleutheronema rhadinum* |
| *Polynemus risua* Hamilton, 1822 | *Polynemus paradiseus* |
| *Polydactylus sealei* Jordan and Richardson, 1910 | *Filimanus sealei* |
| *Polynemus sele* Hamilton, 1822 | *Leptomelanosoma indicum* |
| *Polynemus senarius* Gronow in Gray, 1854 | *Filimanus hexanema* |
| *Polynemus sexfilis* Valenciennes, 1831 | *Polydactylus sexfilis* |
| *Polynemus sextarius* Bloch and Schneider, 1801 | *Polydactylus sextarius* |
| *Polynemus sextarius mullani* Hora, 1926 | *Polydactylus mullani* |
| *Polynemus sheridani* Macleay, 1884 | *Polydactylus macrochir* |
| *Polydactylus siamensis* Motomura, Iwatsuki and Yoshino, 2001 | *Polydactylus siamensis* |
| *Filimanus similis* Feltes, 1991 | *Filimanus similis* |
| *Polynemus specularis* De Vis, 1883 | *Polydactylus multiradiatus* |
| *Polynemus taeniatus* Günther, 1860 | *Polydactylus plebeius* |
| *Polynemus teria* Hamilton, 1822 | *Eleutheronema tetradactylum* |
| *Polynemus tetradactylus* Shaw, 1804 | *Eleutheronema tetradactylum* |
| *Polynemus toposui* Hamilton, 1822 | *Polynemus paradiseus* |
| *Polynemus tridactylus* Bleeker, 1849 | *Eleutheronema tridactylum* |
| *Polynemus uronemus* Cuvier, 1829a | *Leptomelanosoma indicum* |
| *Polynemus verekeri* Saville-Kent, 1889 | *Parapolynemus verekeri* |
| *Polynemus virginicus* Linnaeus, 1758 | *Polydactylus virginicus* |
| *Polynemus xanthonemus* Valenciennes, 1831 | *Filimanus xanthonema* |
| *Polydactylus zophomus* Jordan and McGregor, 1907 | *Polydactylus microstomus* |

## 4. LIST OF SPECIES BY MAJOR FISHING AREAS

| SPECIES | FRESH-WATERS | GEOGRAPHICAL DISTRIBUTION | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MAJOR FISHING AREA FOR STATISTICAL PURPOSES | | | | | | | | | | | | |
| | | 21 | 31 | 34 | 37 | 41 | 47 | 51 | 57 | 61 | 71 | 77 | 81 | 87 |
| *Eleutheronema rhadinum* | | | | | | | | | | ● | | | | |
| *Eleutheronema tetradactylum* | | | | | | | | ● | ● | | ● | | | |
| *Eleutheronema tridactylum* | | | | | | | | | ● | | ● | | | |
| *Filimanus heptadactyla* | | | | | | | | | | | ● | | | |
| *Filimanus hexanema* | | | | | | | | | ● | | ● | | | |
| *Filimanus perplexa* | | | | | | | | | ● | | ● | | | |
| *Filimanus sealei* | | | | | | | | | | | ● | | | |
| *Filimanus similis* | | | | | | | | ● | ● | | | | | |
| *Filimanus xanthonema* | | | | | | | | | ● | | ● | | | |
| *Galeoides decadactylus* | | | | ● | ● | | ● | | | | | | | |
| *Leptomelanosoma indicum* | | | | | | | | ● | ● | | ● | | | |
| *Parapolynemus verekeri* | 06 | | | | | | | | | | ● | | | |
| *Pentanemus quinquarius* | | | | ● | | | ● | | | | | | | |
| *Polydactylus approximans* | | | | | | | | | | | | ● | | ● |
| *Polydactylus bifurcus* | | | | | | | | | ● | | ● | | | |
| *Polydactylus longipes* | | | | | | | | | | | ● | | | |
| *Polydactylus macrochir* | | | | | | | | | ● | | ● | | | |
| *Polydactylus macrophthalmus* | 04 | | | | | | | | | | ● | | | |
| *Polydactylus malagasyensis* | | | | | | | | ● | | | | | | |
| *Polydactylus microstomus* | | | | | | | | ● | ● | ● | ● | | | |
| *Polydactylus mullani* | | | | | | | | ● | | | | | | |
| *Polydactylus multiradiatus* | | | | | | | | | ● | | ● | | ● | |
| *Polydactylus nigripinnis* | | | | | | | | | ● | | ● | | | |
| *Polydactylus octonemus* | | ● | ● | | | | | | | | | | | |
| *Polydactylus oligodon* | | | ● | | | ● | | | | | | | | |

| SPECIES | FRESH-WATERS | GEOGRAPHICAL DISTRIBUTION | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MAJOR FISHING AREA FOR STATISTICAL PURPOSES | | | | | | | | | | | | |
| | | 21 | 31 | 34 | 37 | 41 | 47 | 51 | 57 | 61 | 71 | 77 | 81 | 87 |
| *Polydactylus opercularis* | | | | | | | | | | | | ● | | |
| *Polydactylus persicus* | | | | | | | | ● | | | | | | |
| *Polydactylus plebeius* | | | | | | | | ● | ● | ● | ● | ● | ● | |
| *Polydactylus quadrifilis* | | | | ● | | | | | | | | | | |
| *Polydactylus sexfilis* | | | | | | | | ● | ● | ● | ● | ● | | |
| *Polydactylus sextarius* | | | | | | | | ● | ● | ● | ● | | | |
| *Polydactylus siamensis* | | | | | | | | | ● | | ● | | | |
| *Polydactylus virginicus* | | ● | ● | | ● | | | | | | | | | |
| *Polynemus aquilonaris* | 04 | | | | | | | | | | ● | | | |
| *Polynemus dubius* | 04 | | | | | | | | | | ● | | | |
| *Polynemus hornadayi* | 04 | | | | | | | | | | ● | | | |
| *Polynemus kapuasensis* | 04 | | | | | | | | | | ● | | | |
| *Polynemus melanochir dulcis* | 04 | | | | | | | | | | ● | | | |
| *Polynemus melanochir melanochir* | 04 | | | | | | | | | | ● | | | |
| *Polynemus multifilis* | 04 | | | | | | | | | | ● | | | |
| *Polynemus paradiseus* | 04 | | | | | | | ● | ● | | ● | | | |

# MAJOR FISHING AREAS FOR STATISTICAL PURPOSES


PROJECTION: GALL (CYLINDRICAL)
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BOUNDARIES OF MAJOR FISHING AREAS
BORDER BETWEEN EUROPEAN AND ASIAN INLAND WATER FISHING AREAS

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# 6. INDEX OF SCIENTIFIC AND VERNACULAR NAMES

EXPLANATION OF THE SYSTEM

***Italics*** : Valid scientific names (double entry by genera and species)

*Italics* : Synonyms and misidentifications (double entry by genera and species)

**ROMAN** : Family names

ROMAN : Names of orders, class, subclass, superfamilies

**Roman** : FAO names

Roman : Local names

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b) *Eleutheronema tetradactylum*, 121 mm SL
c) *Eleutheronema tridactylum*, 180 mm SL
d) *Filimanus heptadactyla*, 90 mm SL
e) *Filimanus hexanema*, 82 mm SL
f) *Filimanus perplexa*, 110 mm SL
g) *Filimanus sealei*, 124 mm SL
h) *Filimanus similis*, 98 mm SL

## PLATE II

a) *Filimanus xanthonema*, 62 mm SL
b) *Galeoides decadactylus*, 250 mm SL
c) *Leptomelanosoma indicum*, 215 mm SL
d) *Parapolynemus verekeri*, 72 mm SL
e) *Pentanemus quinquarius*, 169 mm SL
f) *Polydactylus approximans*, 250 mm SL
g) *Polydactylus bifurcus*, 144 mm SL
h) *Polydactylus longipes*, 159 mm SL

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b) *Polydactylus macrophthalmus*, 88 mm SL
c) *Polydactylus malagasyensis*, 140 mm SL
d) *Polydactylus microstomus*, 101 mm SL
e) *Polydactylus mullani*, 145 mm SL
f) *Polydactylus multiradiatus*, 170 mm SL
g) *Polydactylus nigripinnis*, 138 mm SL
h) *Polydactylus octonemus*, 135 mm SL

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a) *Polydactylus oligodon*
b) *Polydactylus opercularis*, 250 mm SL
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g) *Polydactylus plebeius*, 169 mm SL
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a) *Polydactylus quadrifilis*
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a) *Polynemus aquilonaris*, 86 mm SL
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c) *Polynemus hornadayi*, 170 mm SL
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f) *Polynemus melanochir melanochir*, 134 mm SL
g) *Polynemus multifilis*
h) *Polynemus paradiseus*, 155 mm SL

## PLATE I

**a) *Eleutheronema rhadinum***
152 mm SL, Linkou, Taipei, Taiwan Province of China
(K.-T. Shao)

**b) *Eleutheronema tetradactylum***
121 mm SL, Kuala Lumpur, Malaysia
(H. Ida)

**c) *Eleutheronema tridactylum***
180 mm SL, Jakarta, Java, Indonesia
(H. Motomura)

**d) *Filimanus heptadactyla***
90 mm SL, Sarawak, Malaysia
(H. Ida)

**e) *Filimanus hexanema***
82 mm SL, Serang, Java, Indonesia
(H. Ida)

**f) *Filimanus perplexa***
110 mm SL, Indonesia
(CSIRO)

**g) *Filimanus sealei***
124 mm SL, Mindanao, Philippines
(H. Motomura)

**h) *Filimanus similis***
98 mm SL, Chennai, India
(H. Motomura)

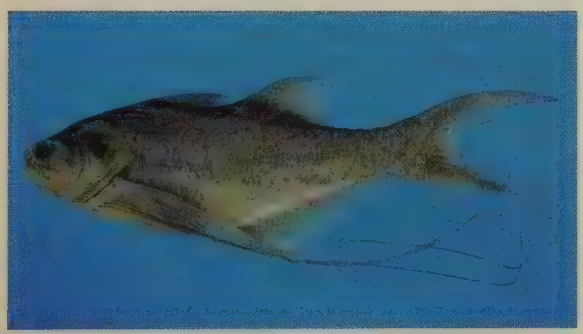
## PLATE II

**a)** ***Filimanus xanthonema***
62 mm SL, Lombok, Indonesia
(S. Kimura)

**b)** ***Galeoides decadactylus***
250 mm SL, Cape Verde, Sal Island
(P.N. Duarte)

**c)** ***Leptomelanosoma indicum***
215 mm SL, Singapore
(H. Motomura)

**d)** ***Parapolynemus verekeri***
72 mm SL, South Alligator River, Australia
(H. Motomura)



**e)** ***Pentanemus quinquarius***
169 mm SL, Senegal
(H. Motomura)

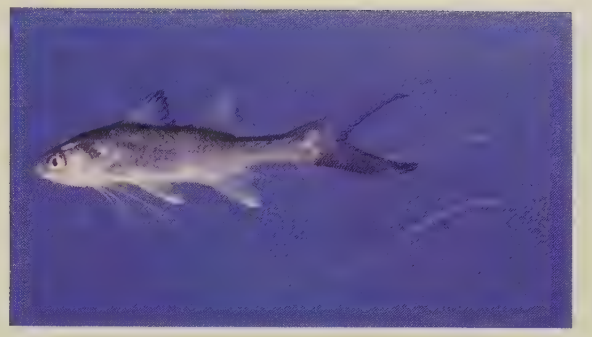
**f)** ***Polydactylus approximans***
250 mm SL, Panama Bay, Panama
(G.R. Allen)

**g)** ***Polydactylus bifurcus***
144 mm SL, Lombok, Indonesia
(S. Kimura)

**h)** ***Polydactylus longipes***
159 mm SL, Mindanao, Philippines
(H. Motomura)

## PLATE III

**a) *Polydactylus macrochir***
200 mm SL, Irian Jaya, Indonesia
(M. Allen)



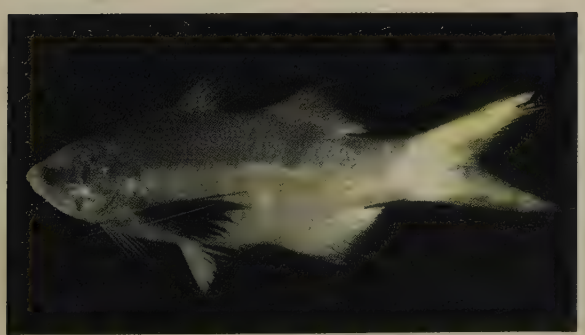
**b) *Polydactylus macrophthalmus***
88 mm SL, Indonesia
(H. Motomura)

**c) *Polydactylus malagasyensis***
140 mm SL, east coast of Africa
(NRIFSF)

**d) *Polydactylus microstomus***
101 mm SL, Ambon, Indonesia
(S. Kimura)

**e) *Polydactylus mullani***
145 mm SL, Arabian Sea, India
(H. Motomura)

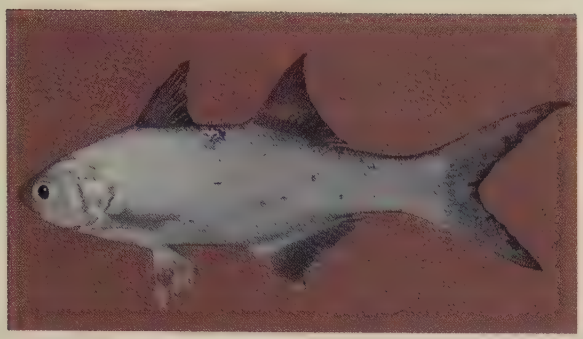
**f) *Polydactylus multiradiatus***
170 mm SL, Queensland, Australia
(J.W. Johnson)



**g) *Polydactylus nigripinnis***
138 mm SL, Arafura Sea
(S. Kimura)

**h) *Polydactylus octonemus***
135 mm SL, off Texas
(H. Motomura)

## PLATE IV

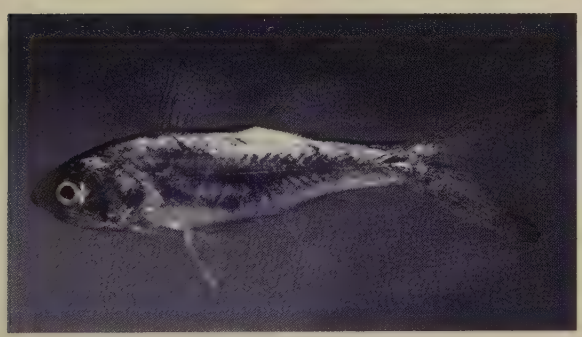


**a) *Polydactylus oligodon***
Northern coast of South America
(F. Cervigón)

**b) *Polydactylus opercularis***
250 mm SL, Panama Bay, Panama
(D.R. Robertson)

**c) *Polydactylus persicus***
155 mm SL, Kuwait Bay, Kuwait
(H. Motomura)

**d) *Polydactylus plebeius***
12 mm SL, Ryukyu Islands, Japan
(H. Kobayashi)



**e) *Polydactylus plebeius***
46 mm SL, Lombok, Indonesia
(K. Matsuura)

**f) *Polydactylus plebeius***
56 mm SL, Lombok, Indonesia
(K. Matsuura)

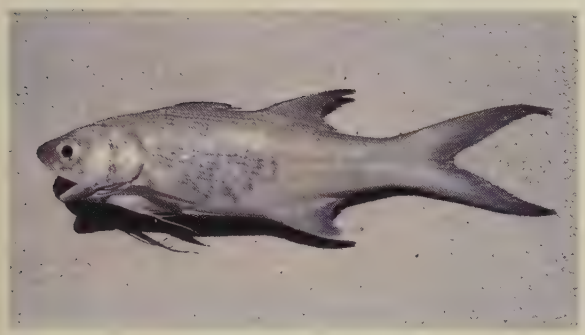
**g) *Polydactylus plebeius***
169 mm SL, Miyazaki, Japan
(H. Motomura)

**h) *Polydactylus plebeius***
248 mm SL, Malindi, Kenya
(J.E. Randall)

## PLATE V

**a)** ***Polydactylus quadrifilis***
Bakau, Gambia
(J. Jensen)

**b)** ***Polydactylus sexfilis***
456 mm SL, Izu Islands, Japan
(H. Senou)



**c)** ***Polydactylus sexfilis***
Coral Sea, Australia
(G.R. Allen)

**d)** ***Polydactylus sexfilis***
Hawaii
(J.E. Randall)

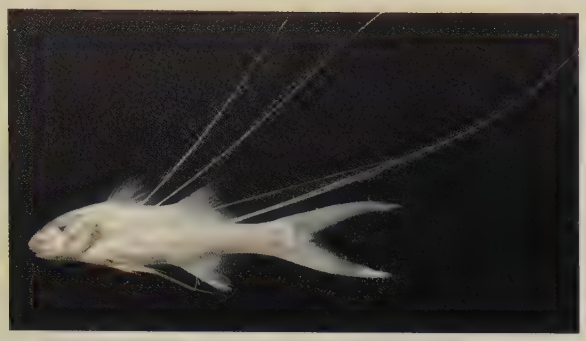
**e)** ***Polydactylus sextarius***
164 mm SL, Miyazaki, Japan
(H. Motomura)

**f)** ***Polydactylus sextarius***
120 mm SL, Gulf of Thailand
(H. Motomura)

**g)** ***Polydactylus siamensis***
174 mm SL, Songkhla, Thailand
(H. Motomura)

**h)** ***Polydactylus virginicus***
Northern coast of South America
(F. Cervigón)

## PLATE VI



**a)** ***Polynemus aquilonaris***
86 mm SL, Chao Phraya River, Thailand
(M.H. Sabaj)

**b)** ***Polynemus dubius***
184 mm SL, Sumatra, Indonesia
(H. Motomura)

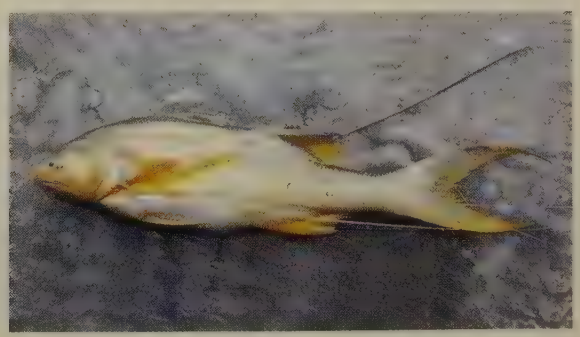
**c)** ***Polynemus hornadayi***
170 mm SL, Sarawak, Malaysia
(H. Motomura)

**d)** ***Polynemus kapuasensis***
127 mm SL, Kapuas River, Indonesia
(M. Kottelat)

**e)** ***Polynemus melanochir dulcis***
135 mm SL, Lake Tonle Sap, Cambodia
(H. Motomura)

**f)** ***Polynemus melanochir melanochir***
134 mm SL, Sabah, Malaysia
(H. Ida)

**g)** ***Polynemus multifilils***
Thailand
(E. Schraml)



**h)** ***Polynemus paradiseus***
155 mm SL, Calcutta, India
(H. Motomura)

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This is the third number in the new FAO series of worldwide annotated and illustrated catalogues of major groups of organisms that enter marine fisheries. The present volume on the family Polynemidae includes 41 species belonging to 8 genera. There is an introductory section with general remarks on habitat and fisheries of the family, a glossary of technical terms, an illustrated key to each genus and all species, and a detailed account for all species. Species accounts include an illustration of each species, scientific and vernacular names, and information on habitat, biology, fisheries, size, relevant literature and distribution. Following the species accounts are a list of nominal species in the family, a table of species by major marine fishing areas and colour plates. A list of all nominal species and their present allocations is given. The work is fully indexed and there is a comprehensive list of references to pertinent literature.

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